

Fig. 1

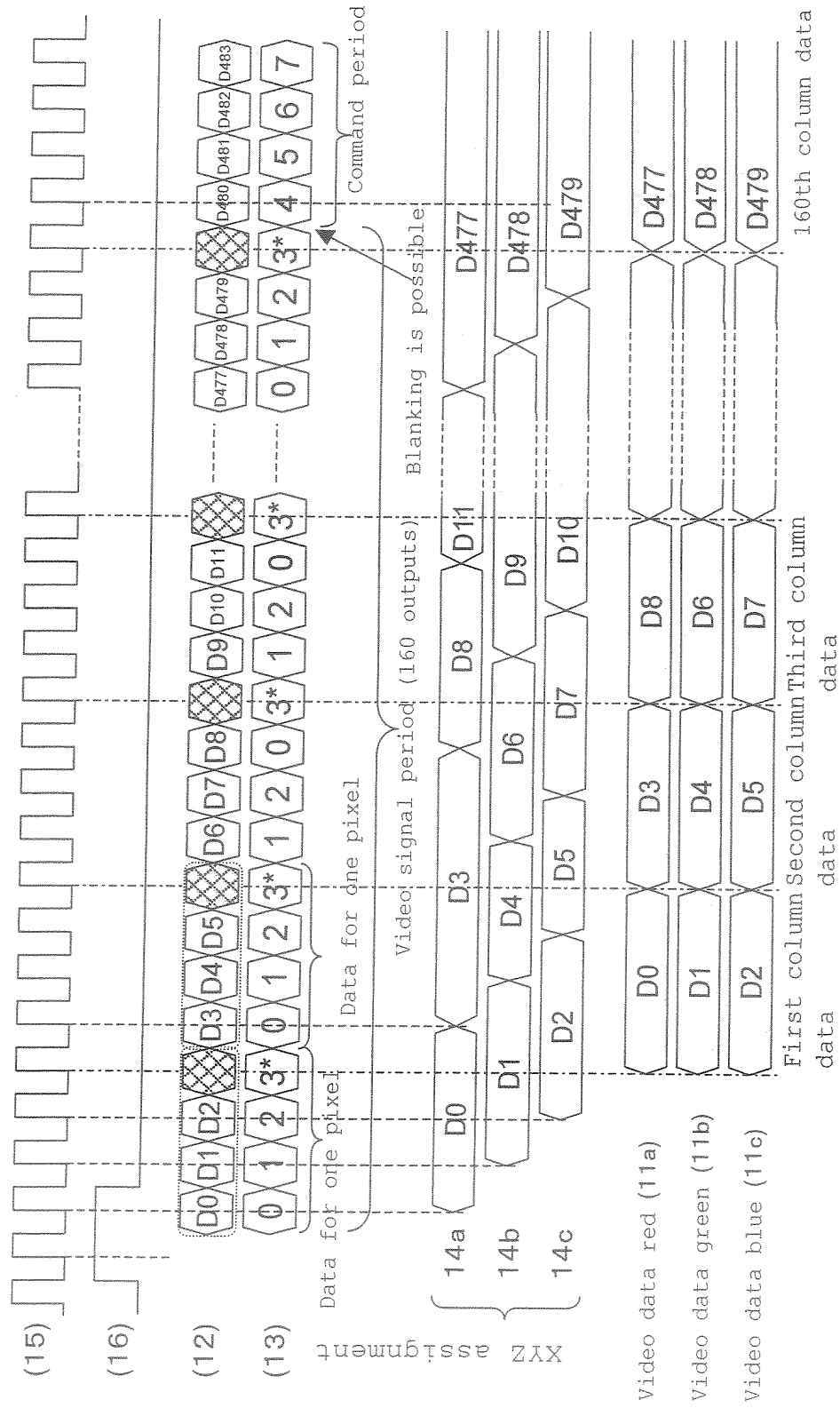


Fig. 2

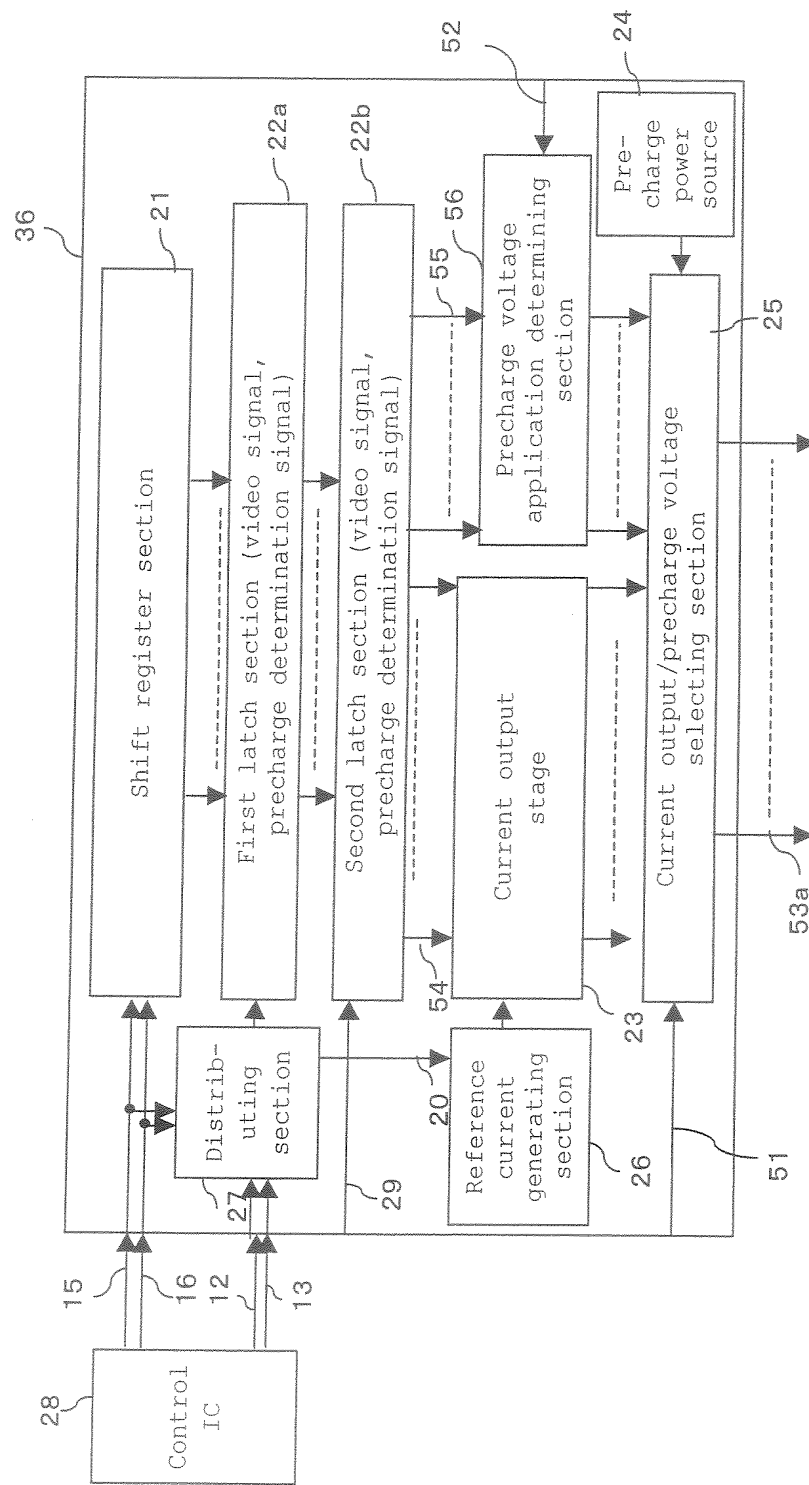
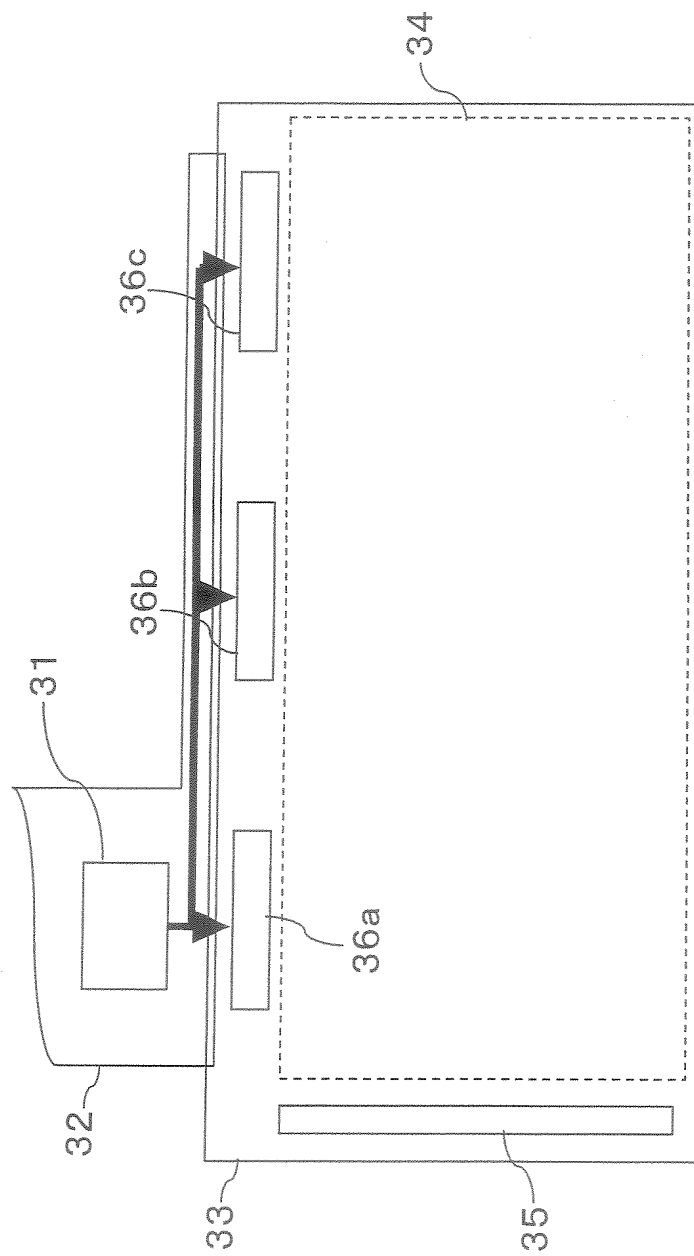


Fig. 3



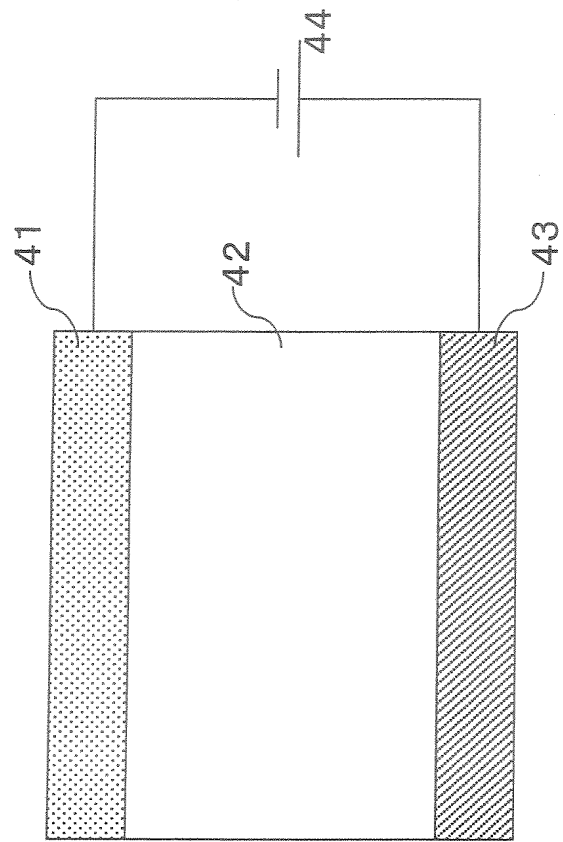


Fig. 4

Fig. 5(a)

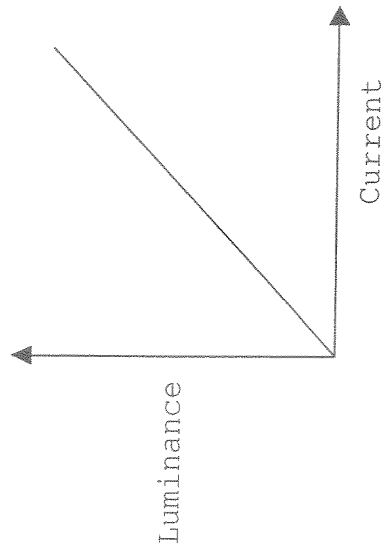


Fig. 5(b)

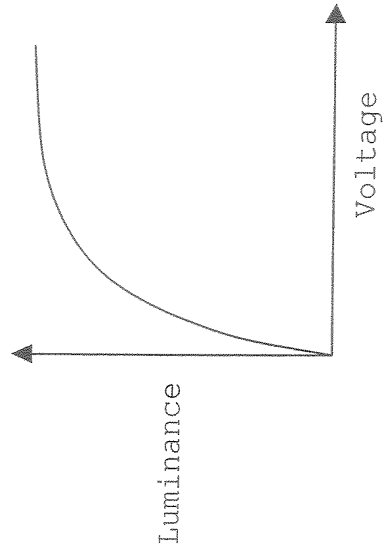


Fig. 6

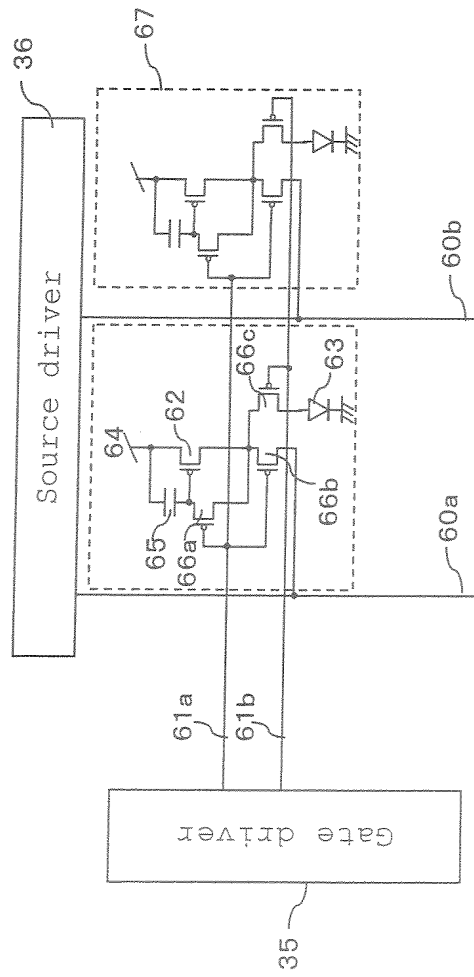


Fig. 7(a)

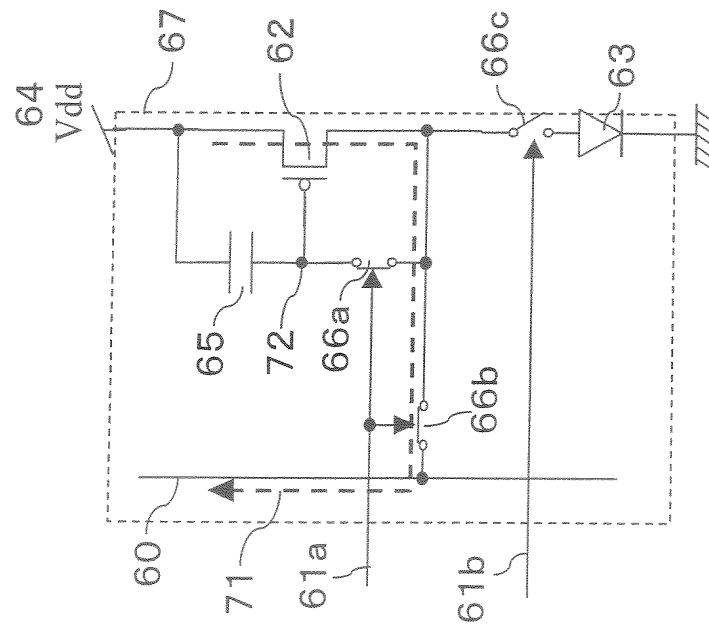
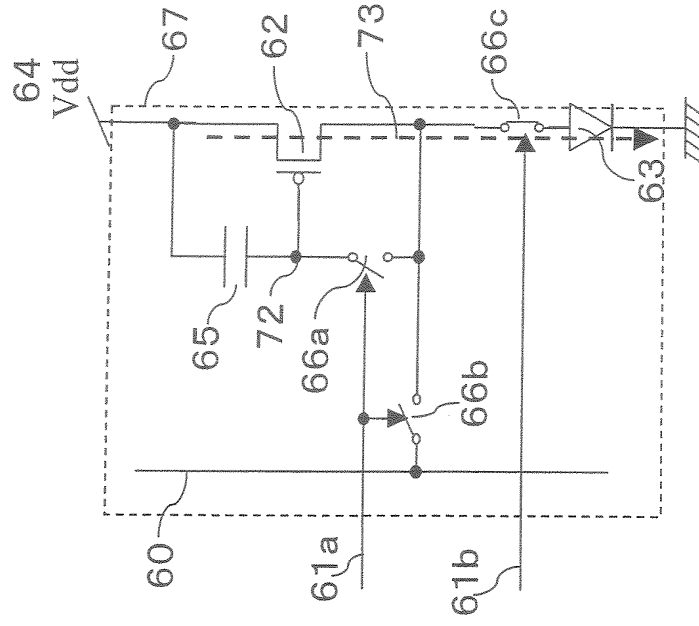


Fig. 7(b)



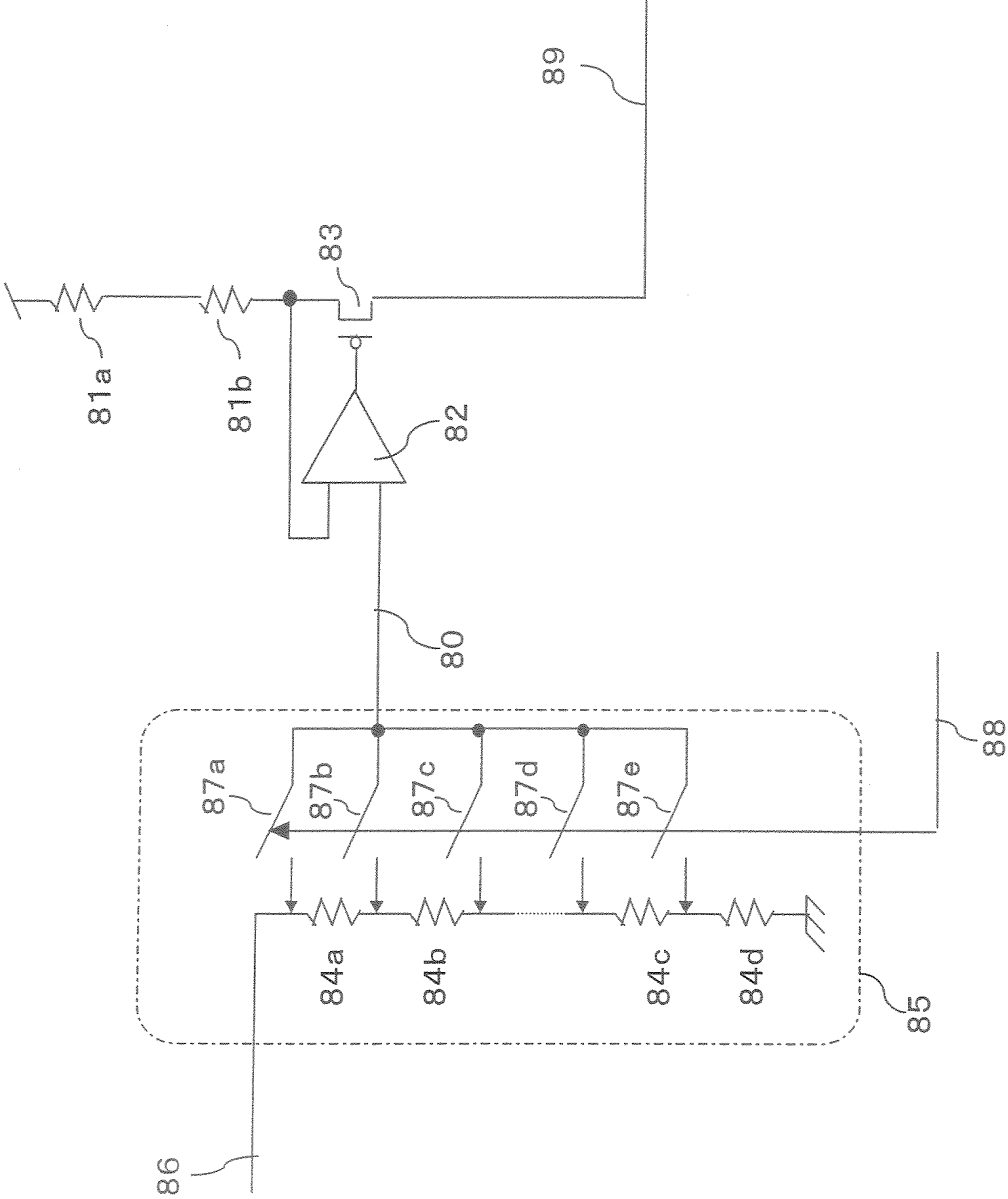


Fig. 8

Fig. 9

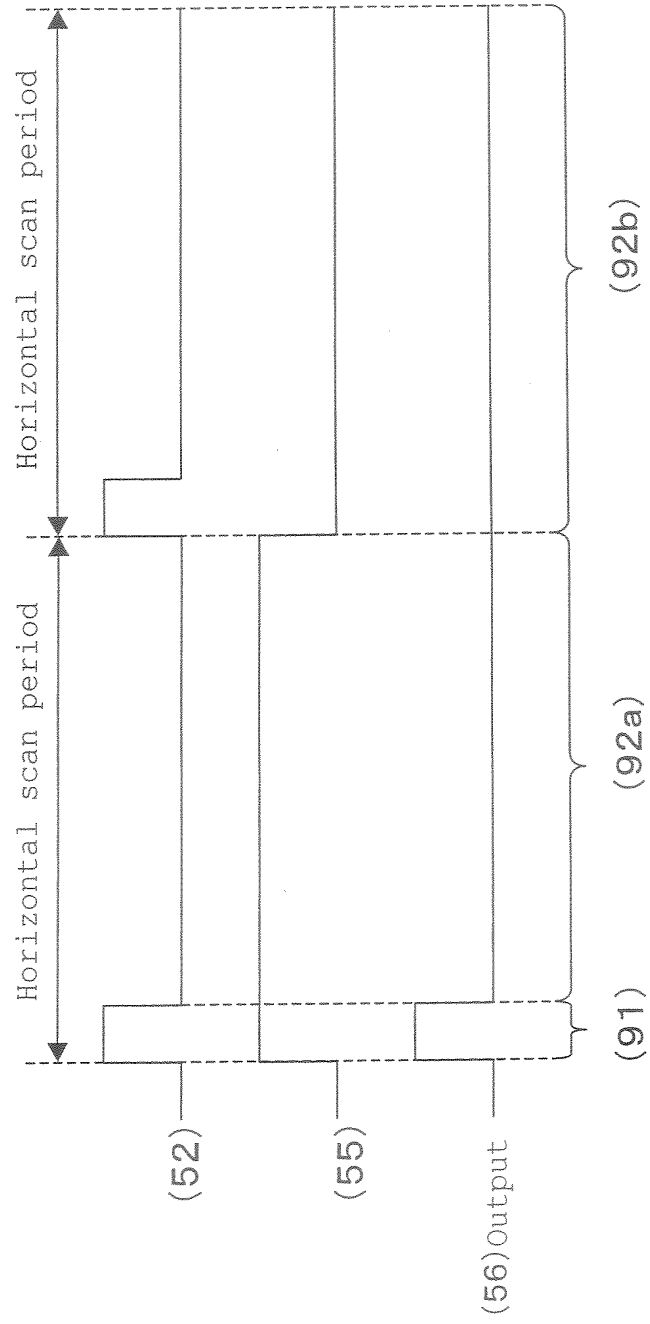
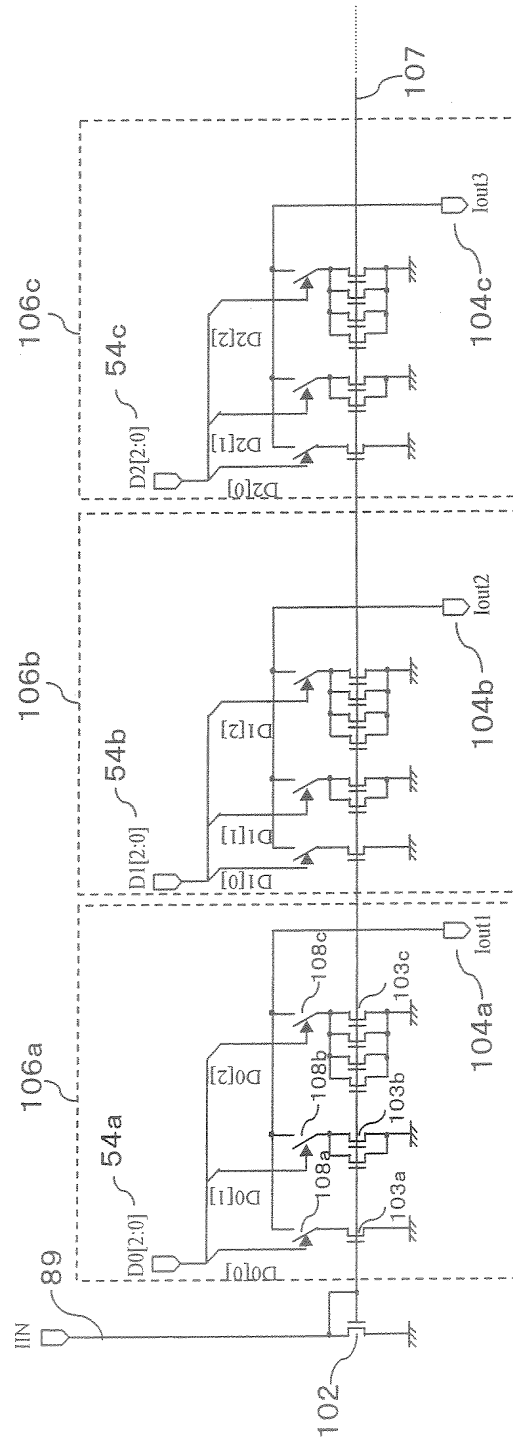


Fig. 10



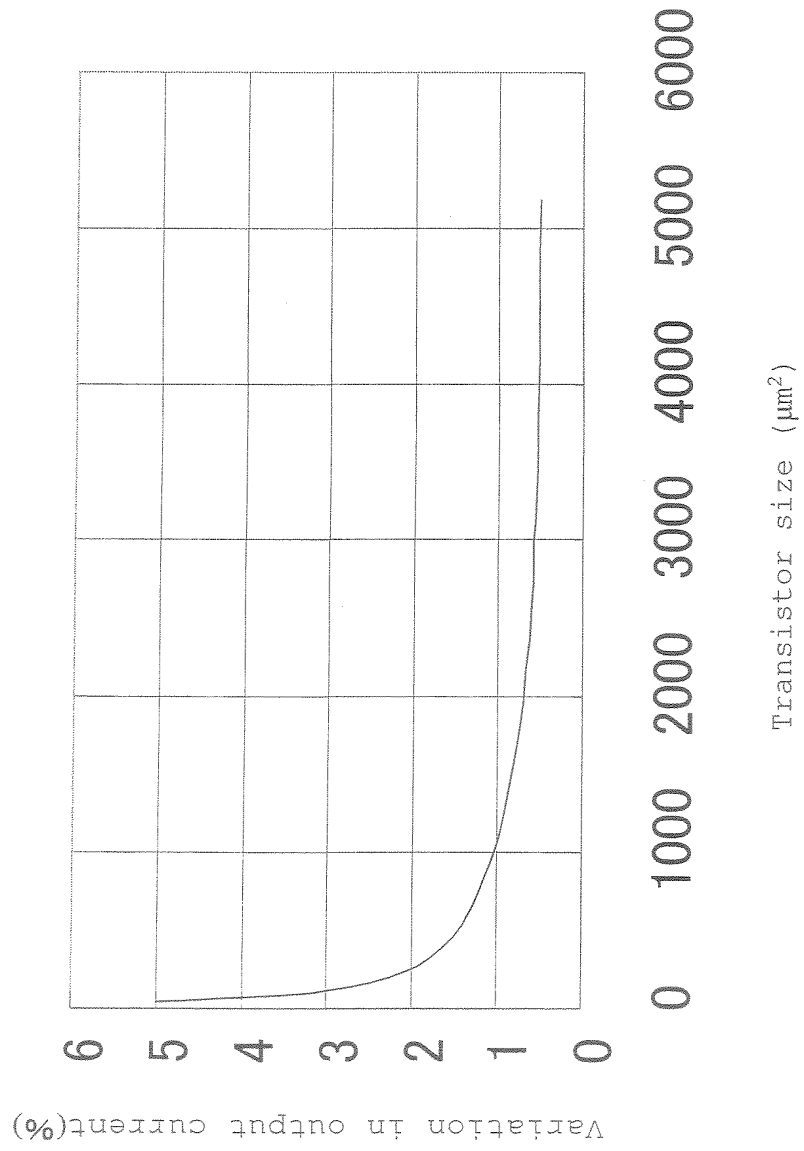


Fig. 11

Fig. 12 (a)

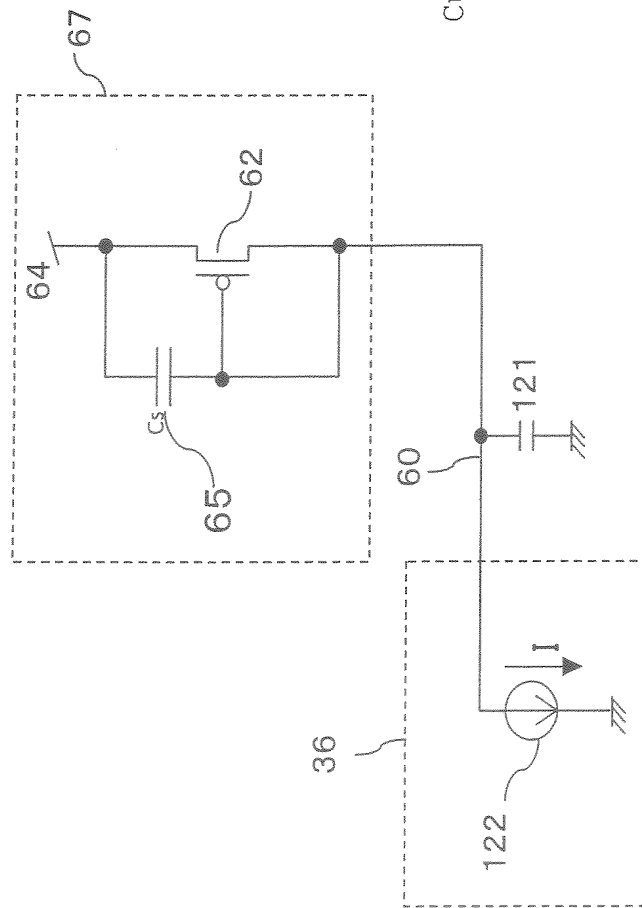


Fig. 12 (b)

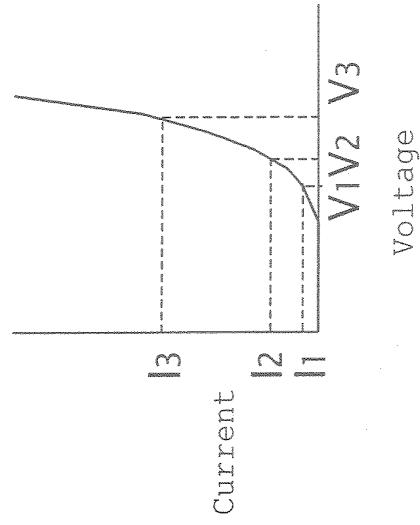


Fig. 14(a)

Gray level	Transistor group	Characteristics of transistor group		
		Channel width [μm]	Channel length [μm]	Variation in output current [%]
1	241a	3.0	54	2.5
2	241b			1.8
4	242a	6.0	27	2.5
8	242b			1.8
16	242c			1.3
32	242d			0.9
64	242e			0.6
128	242f			0.5

Fig. 14(b)

Gray level	Transistor group	Characteristics of transistor group		
		Channel width [μm]	Channel length [μm]	Variation in output current [%]
1	241a	1.5	27	5.0
2	241b			3.5
4	242a	6.0	27	2.5
8	242b			1.8
16	242c			1.3
32	242d			0.9
64	242e			0.6
128	242f			0.5

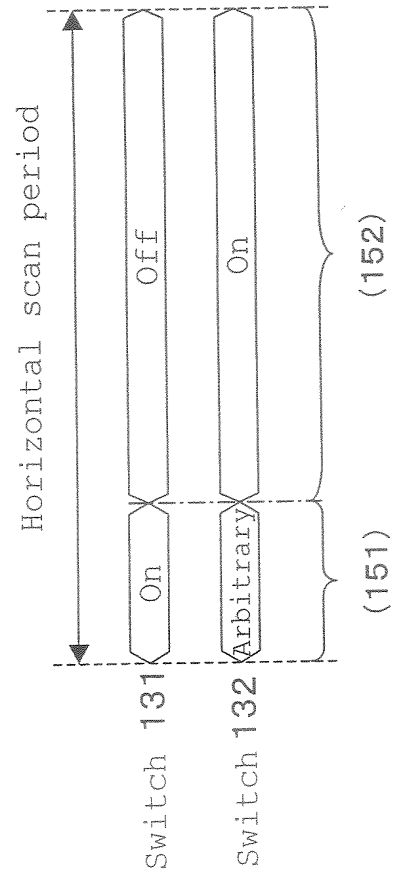


Fig. 15

Fig. 16

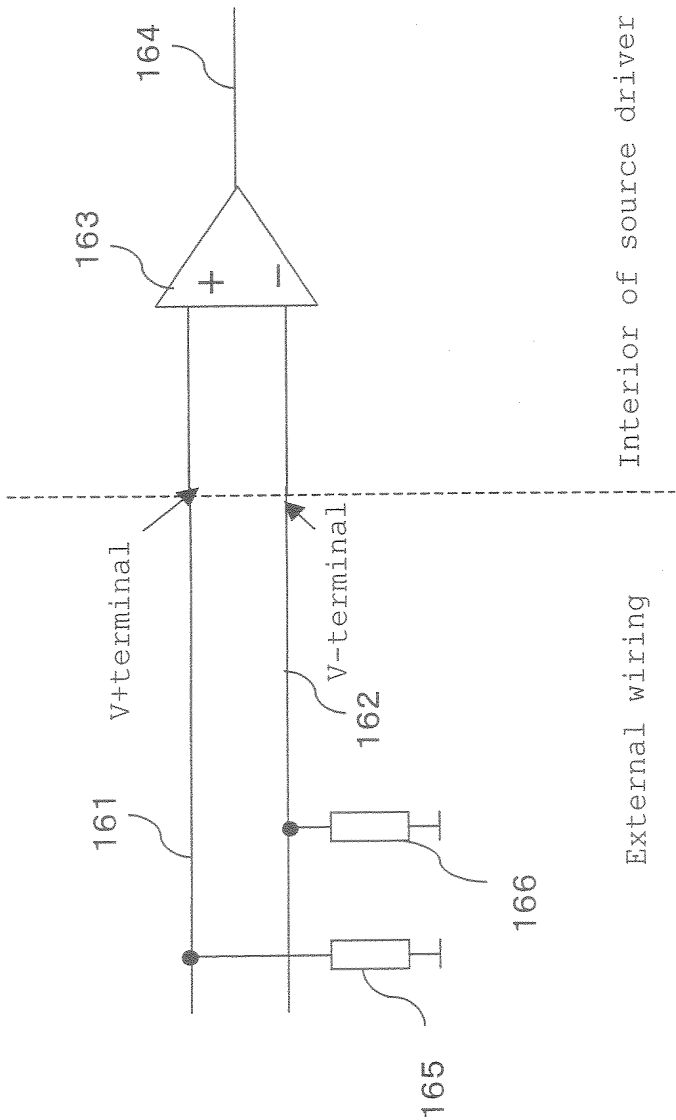


Fig. 17 (a)

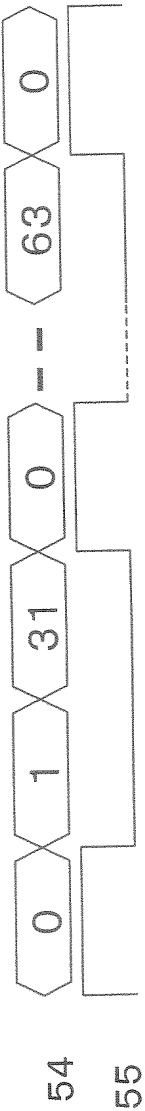


Fig. 17 (b)

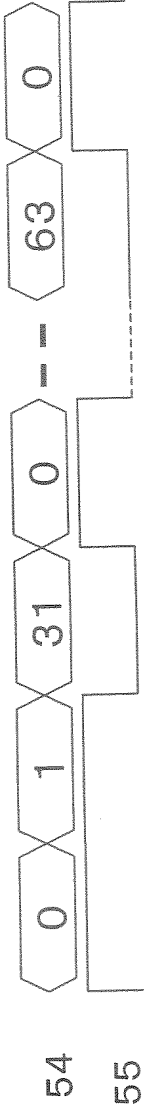


Fig. 17 (c)

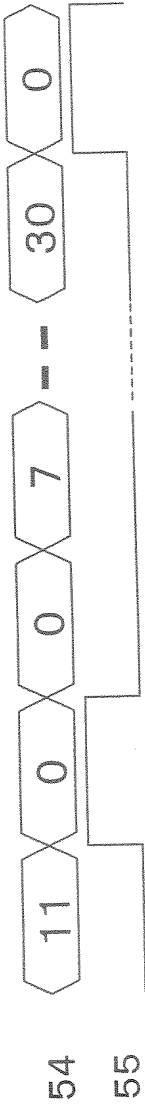


Fig. 18

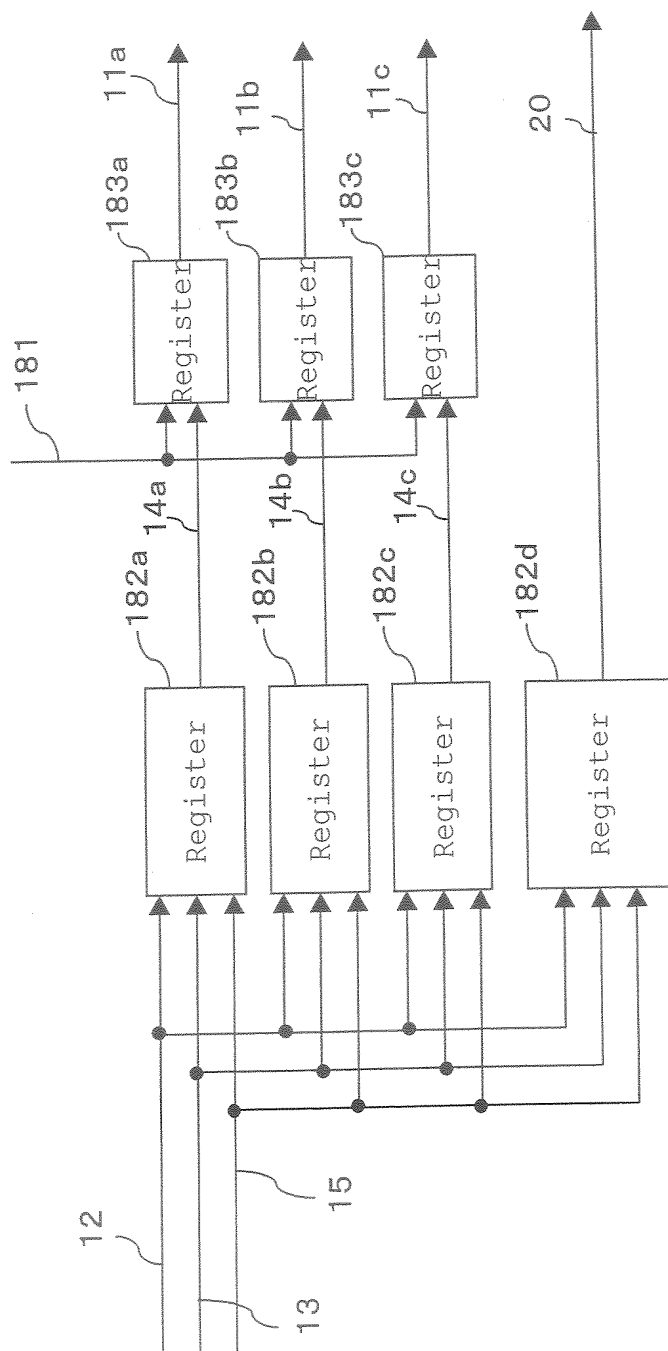


Fig. 19

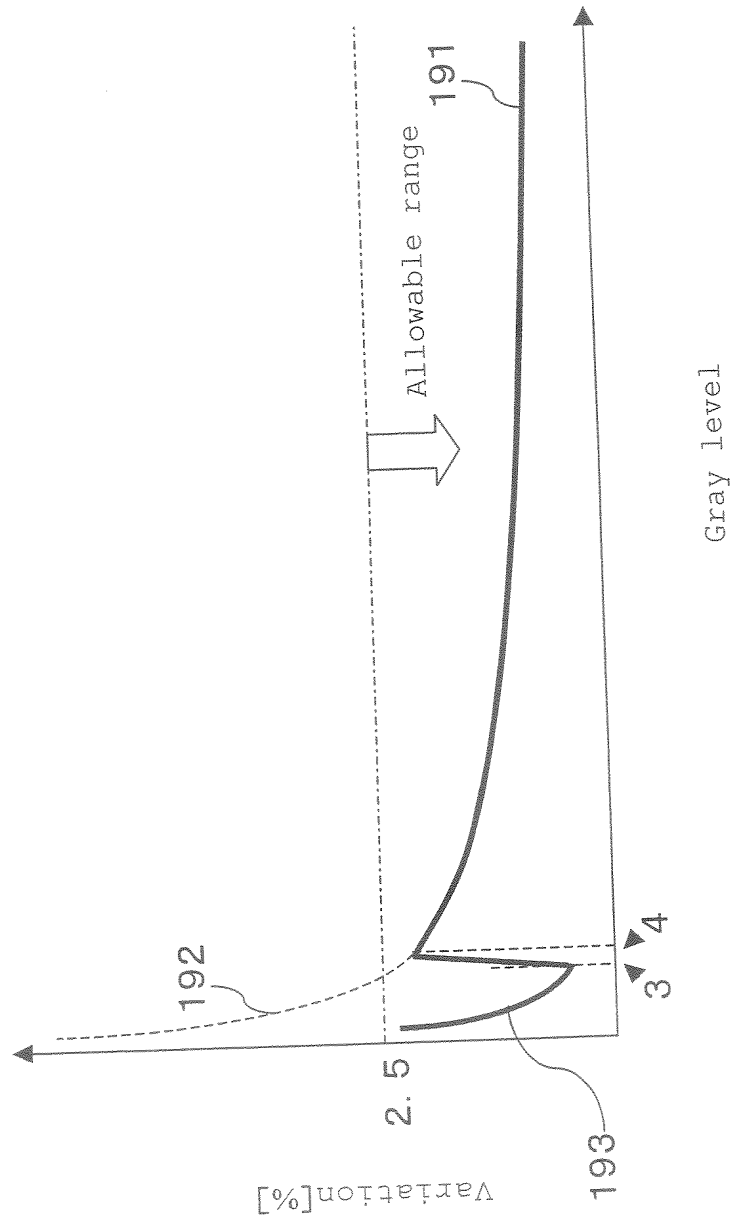


Fig. 20

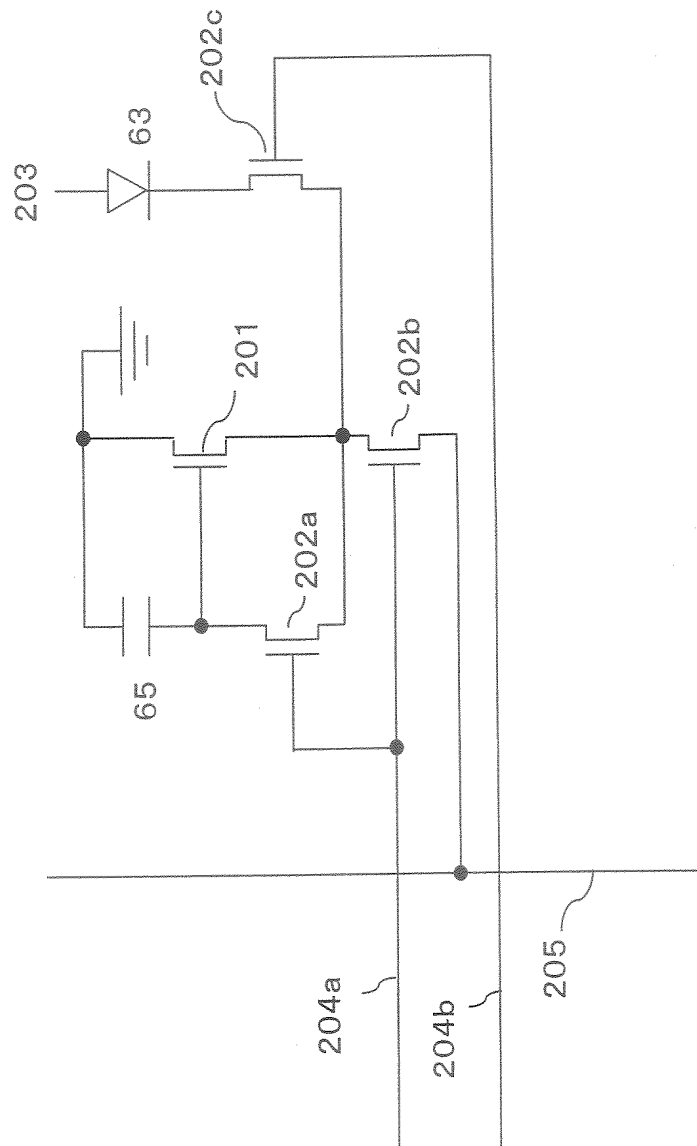
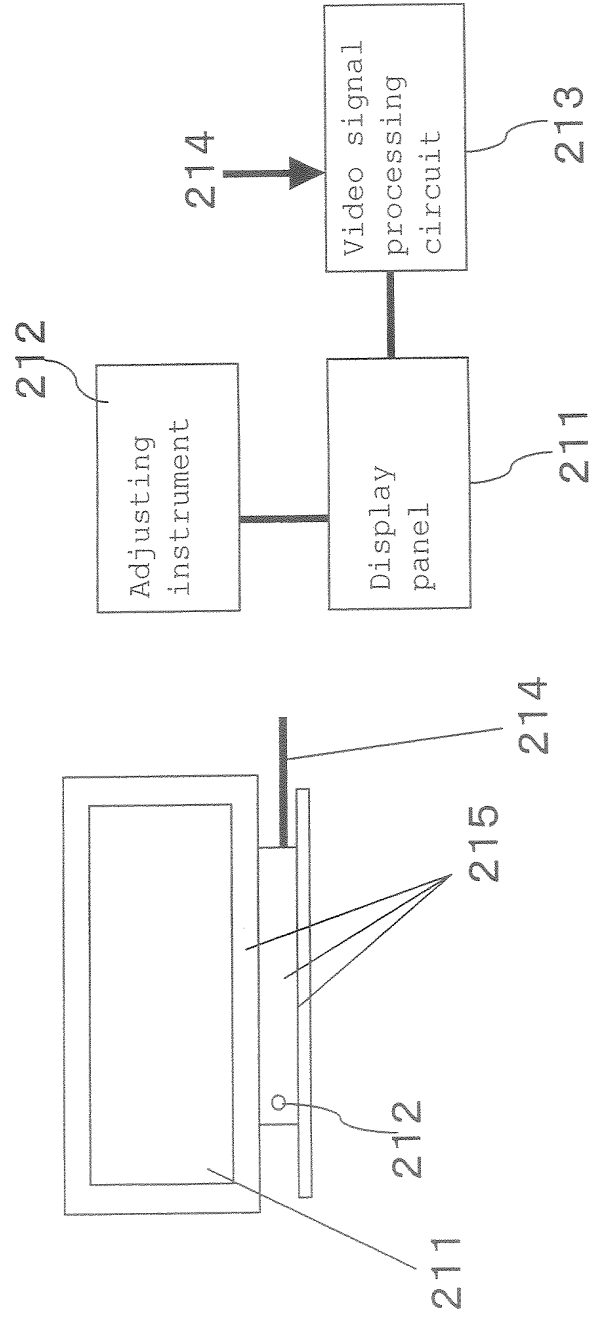


Fig. 21



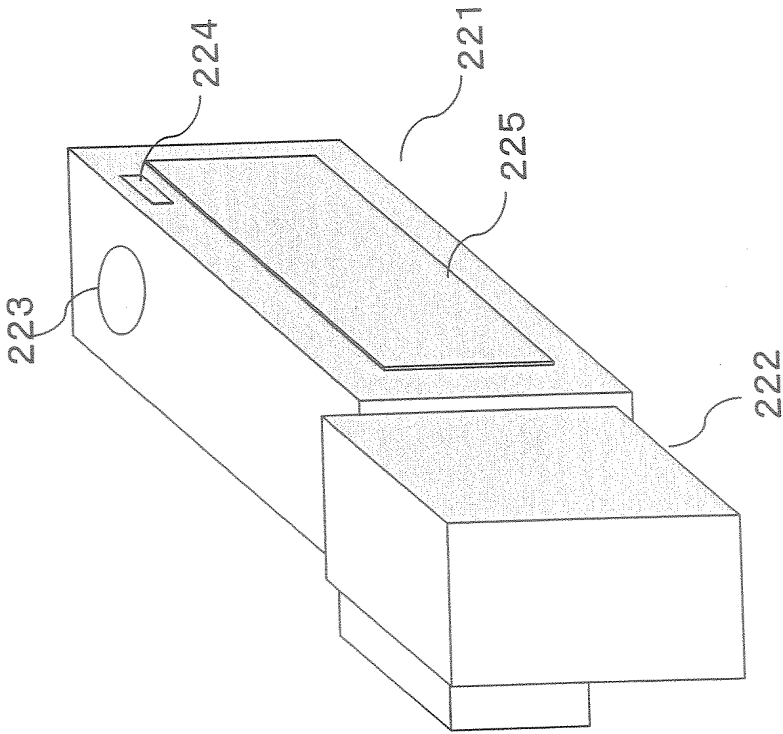


Fig. 22

Fig. 23

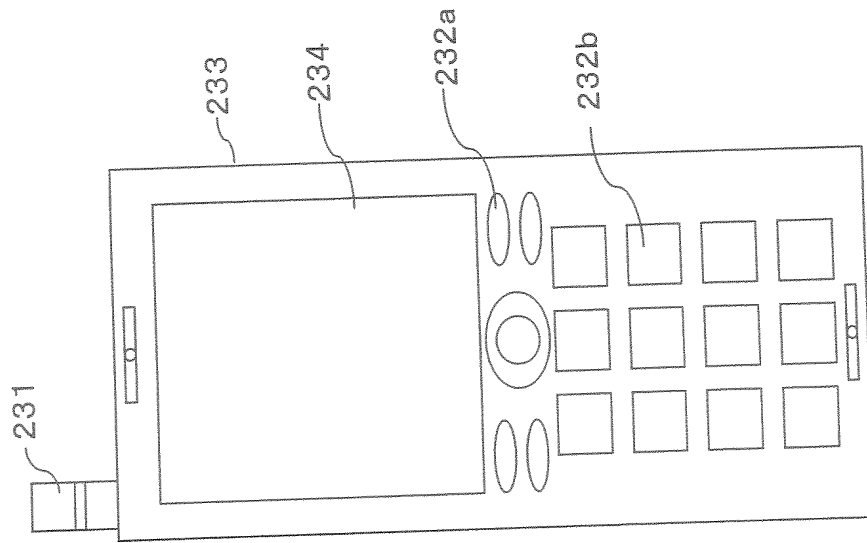


Fig. 24

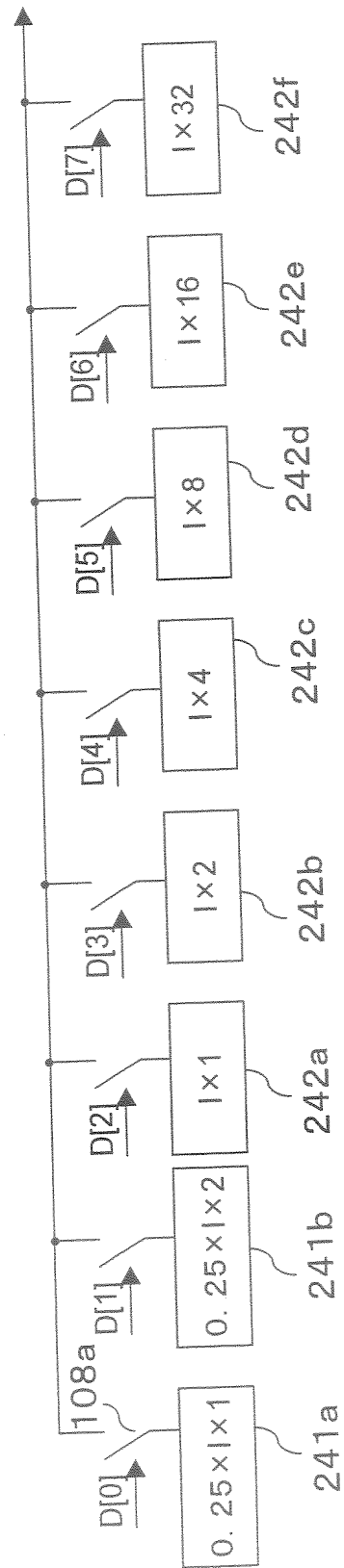
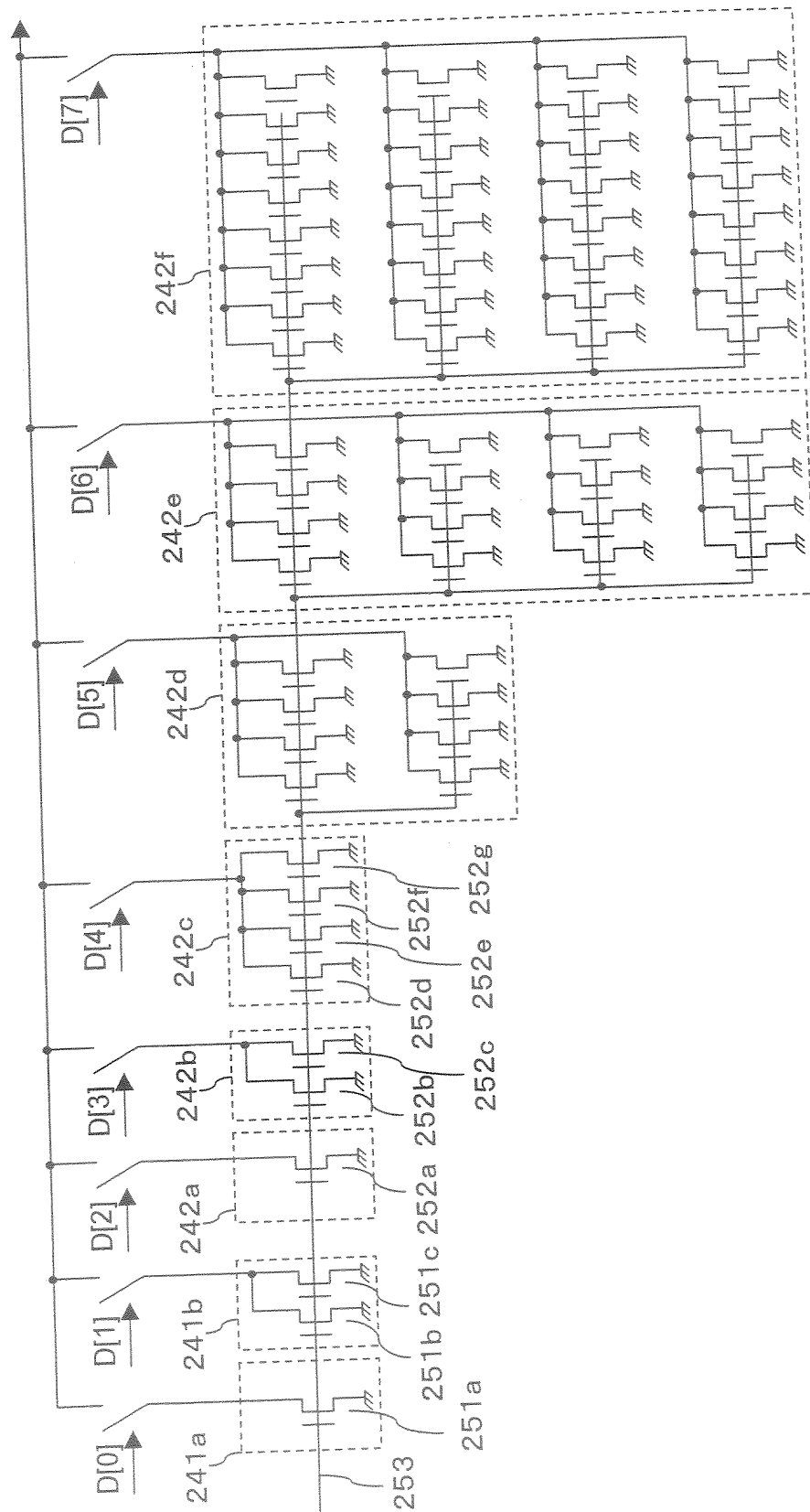


Fig. 25



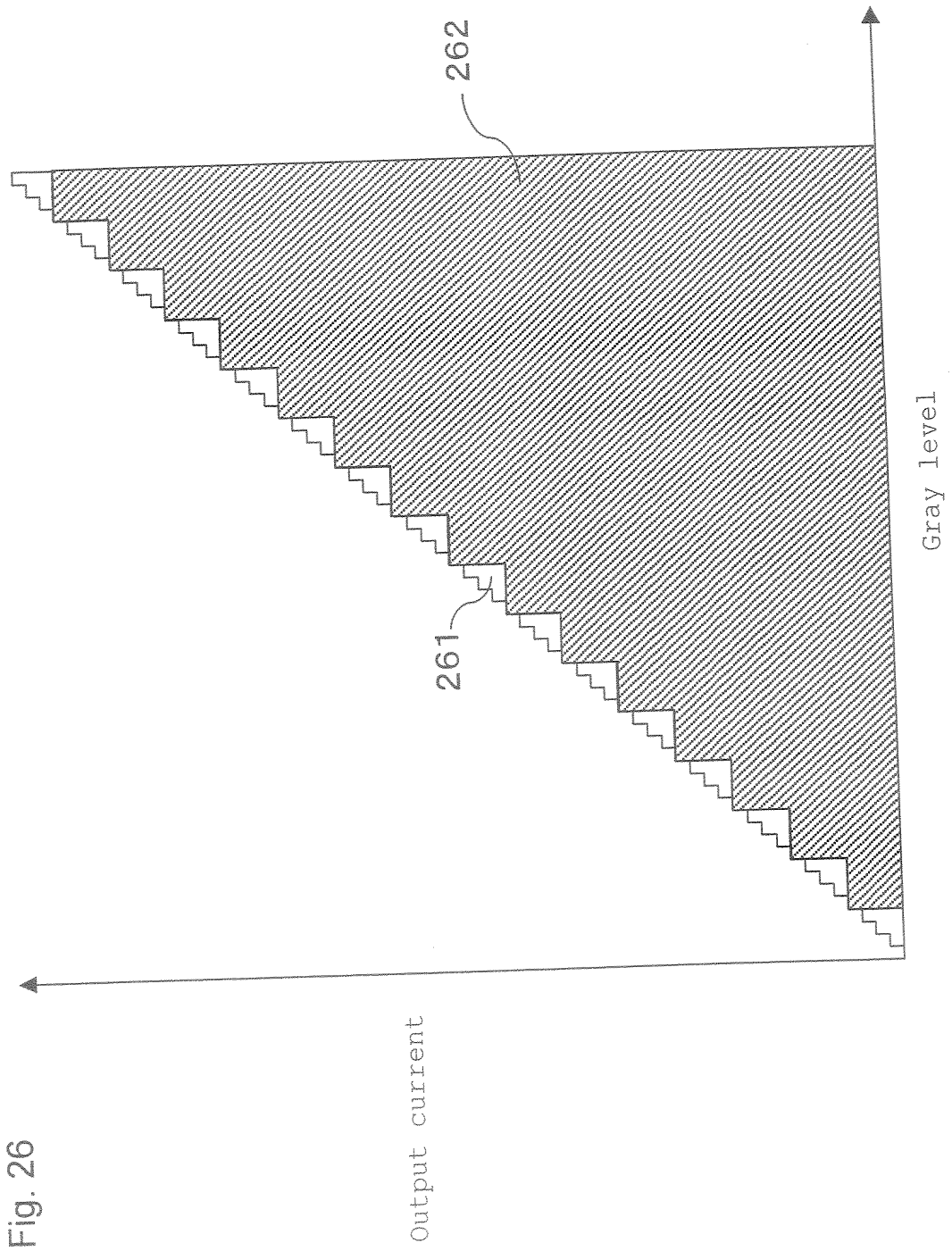


Fig. 27

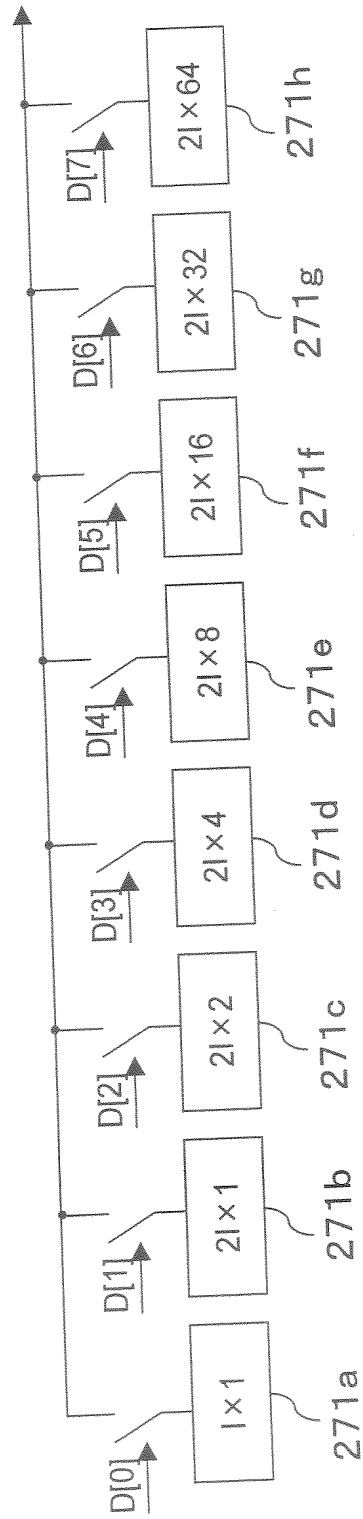
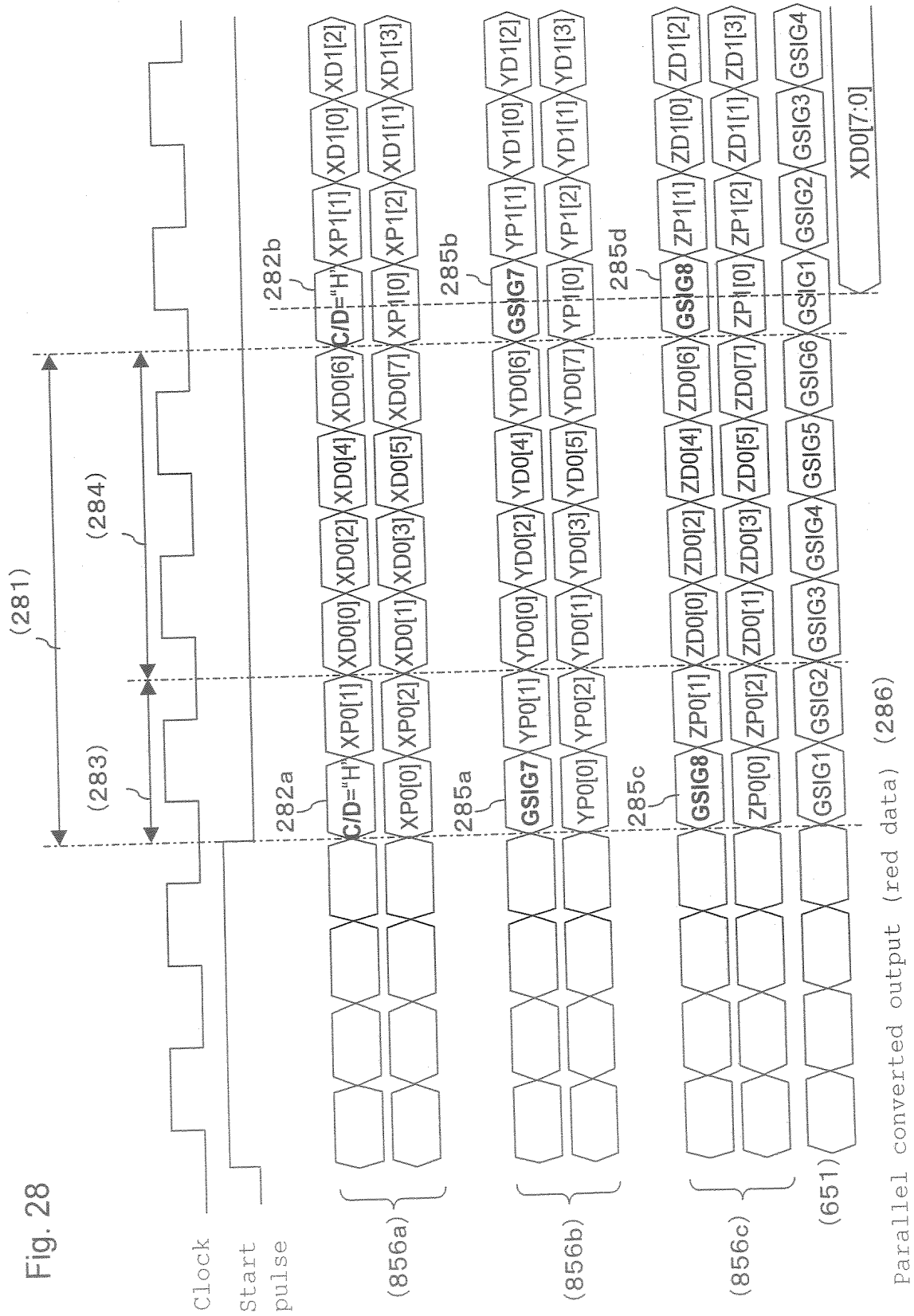


Fig. 28



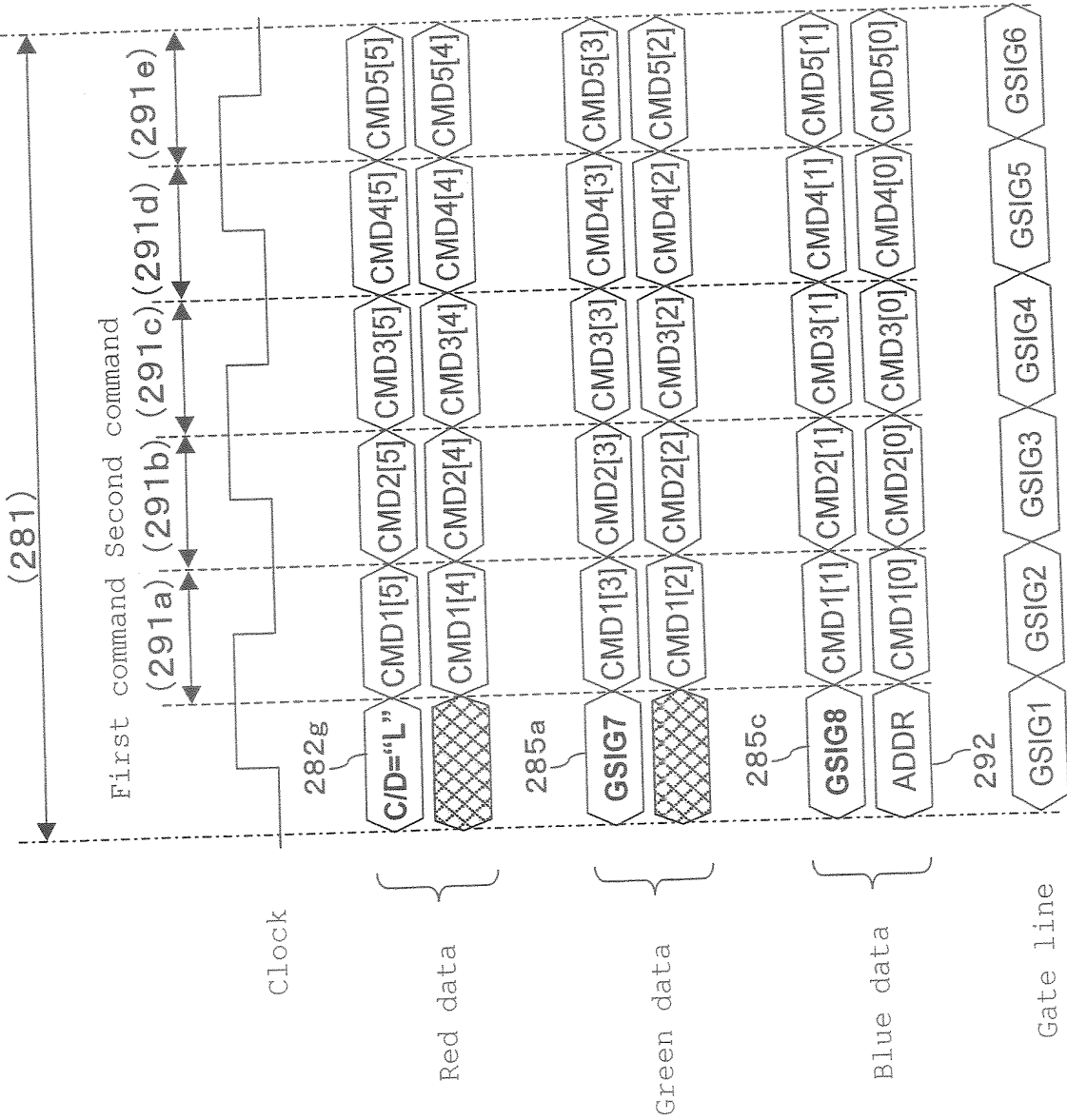


Fig. 29

Fig. 30

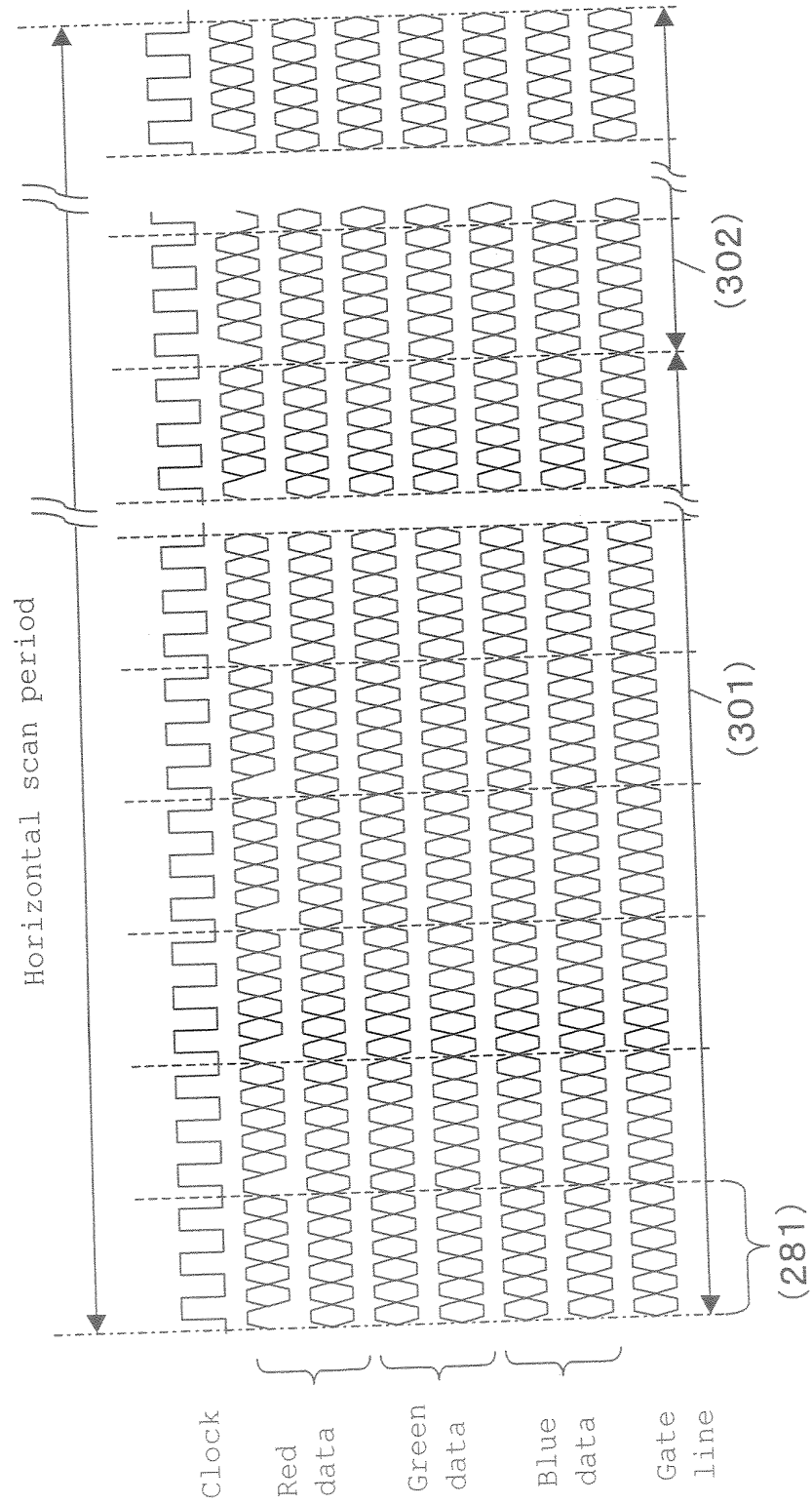


Fig. 31

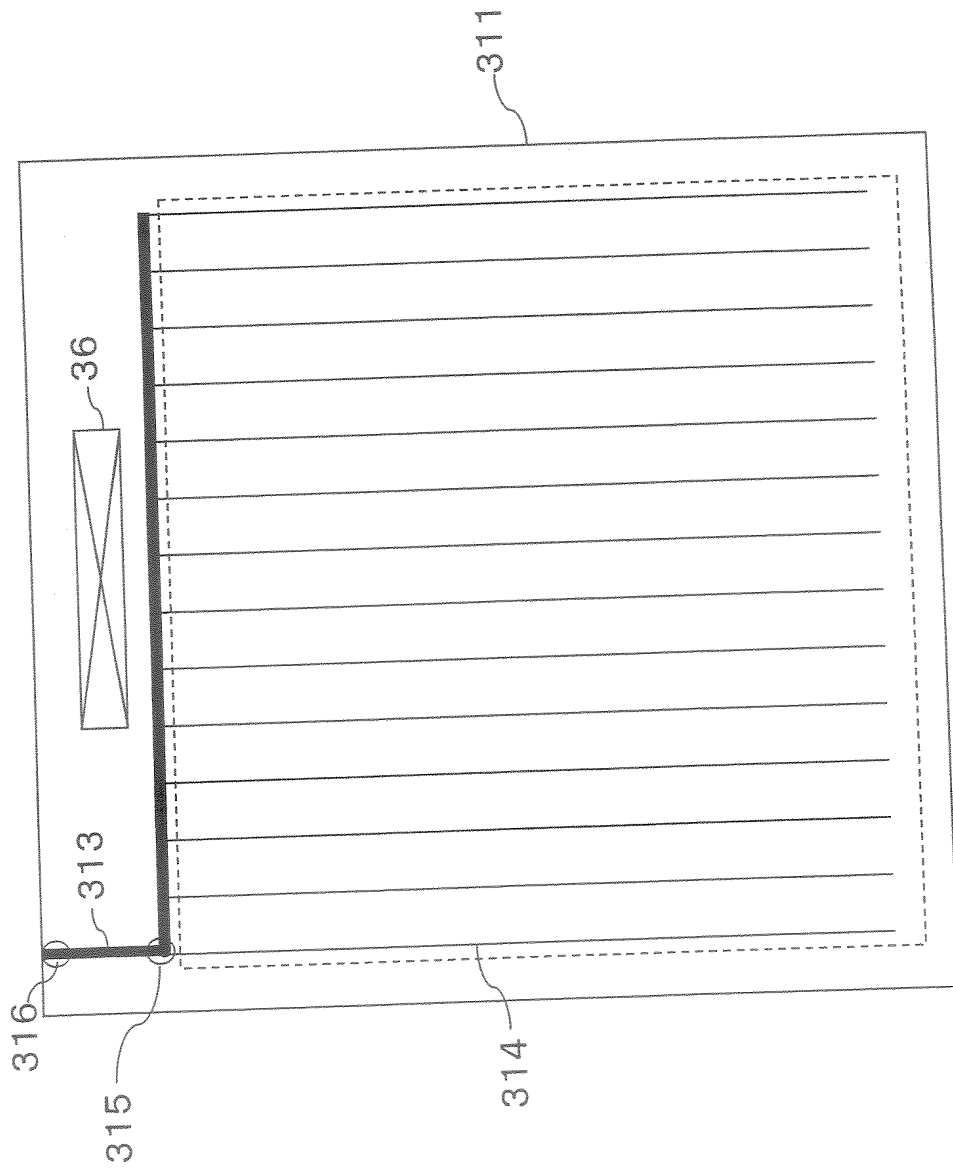


Fig. 32

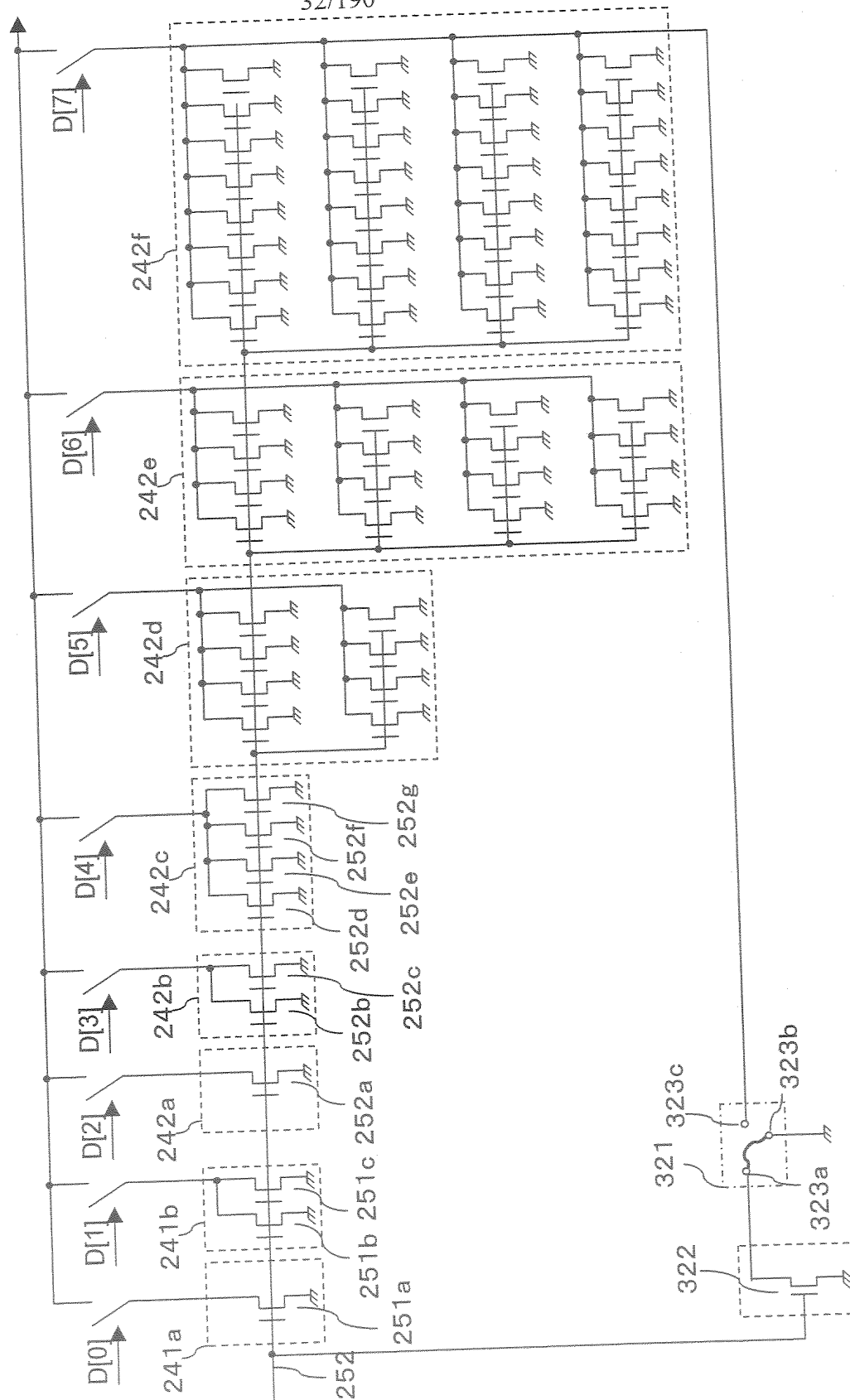


Fig. 33

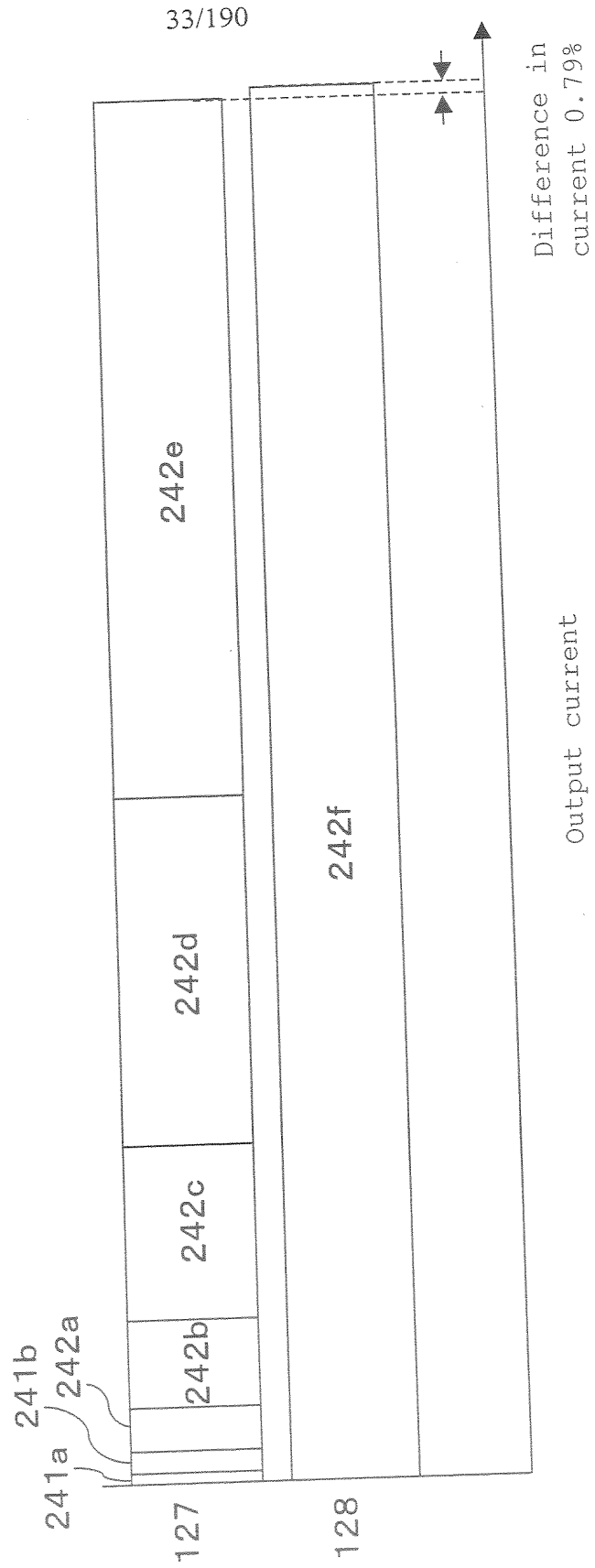


Fig. 34

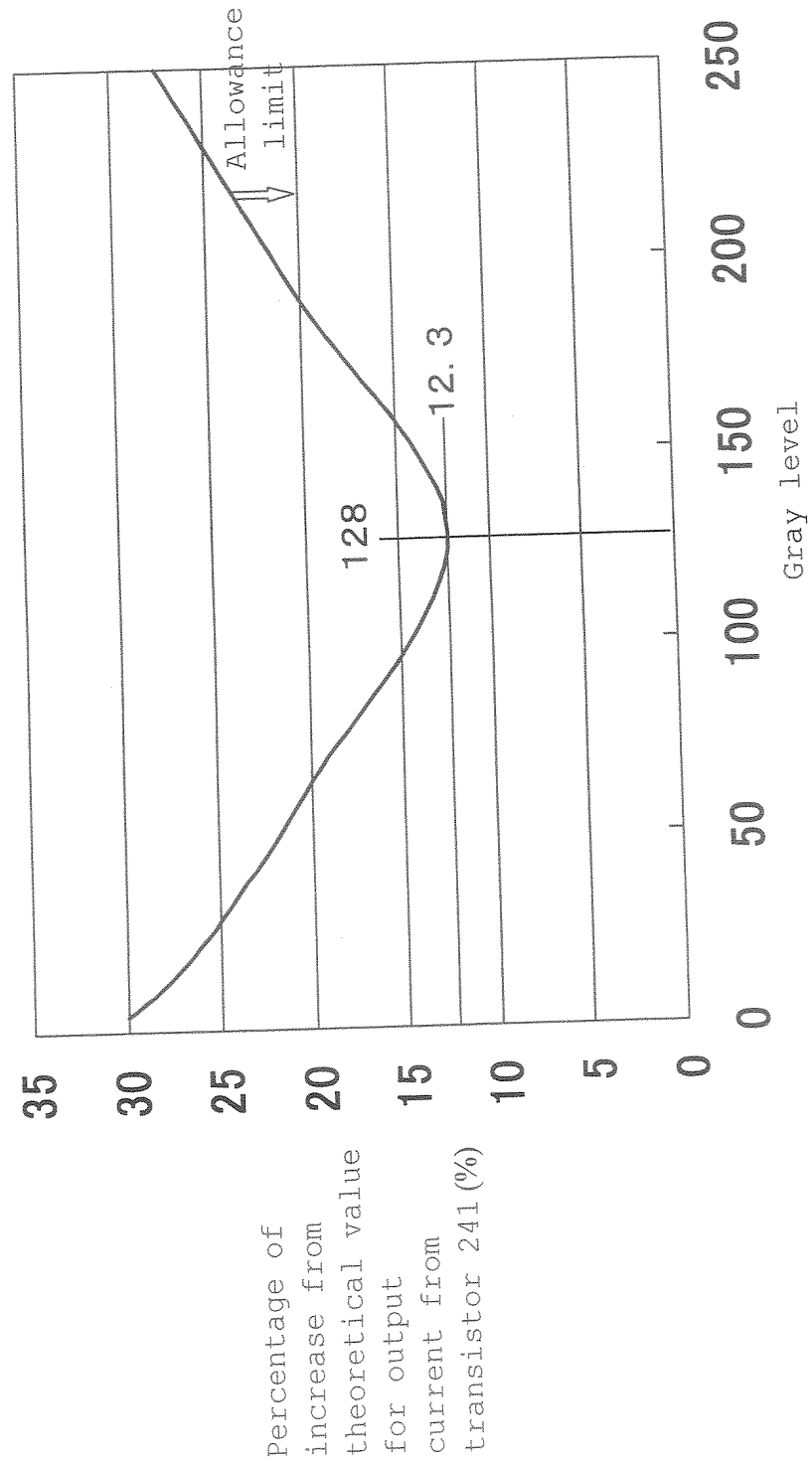


Fig. 35

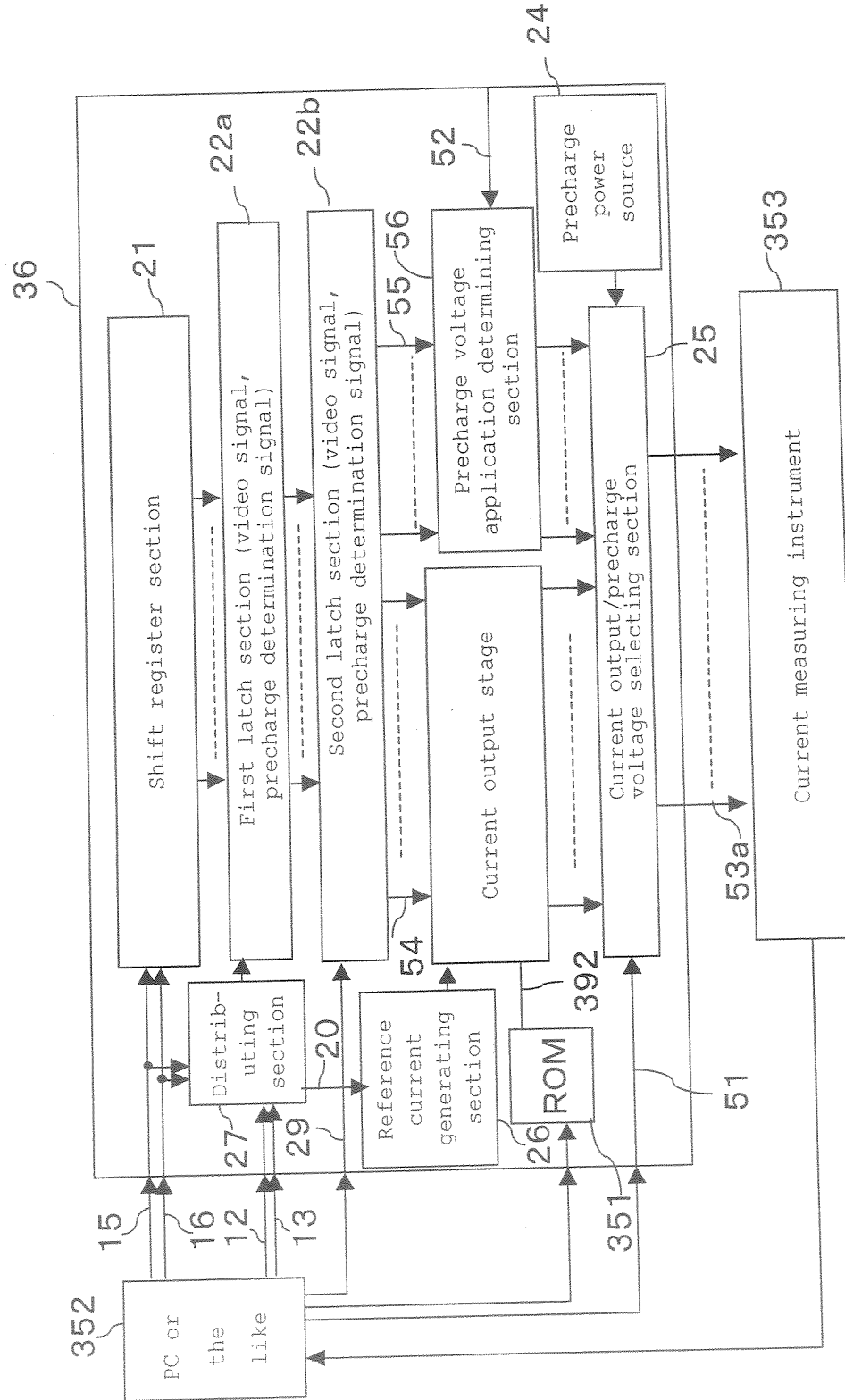


Fig. 36

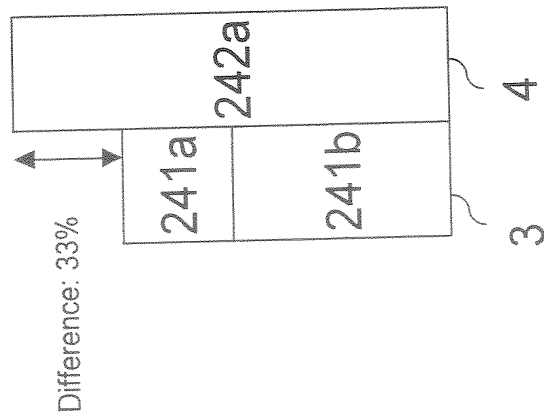


Fig. 37

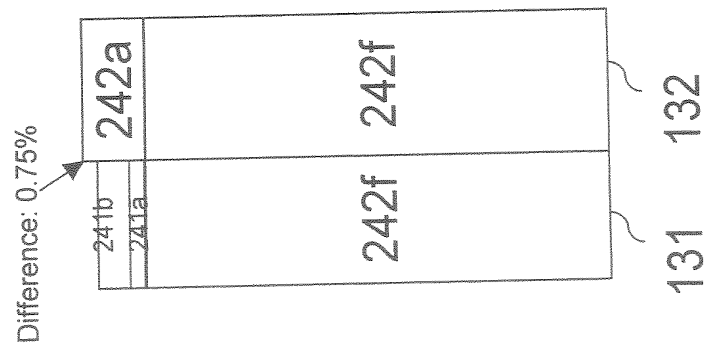


Fig. 38

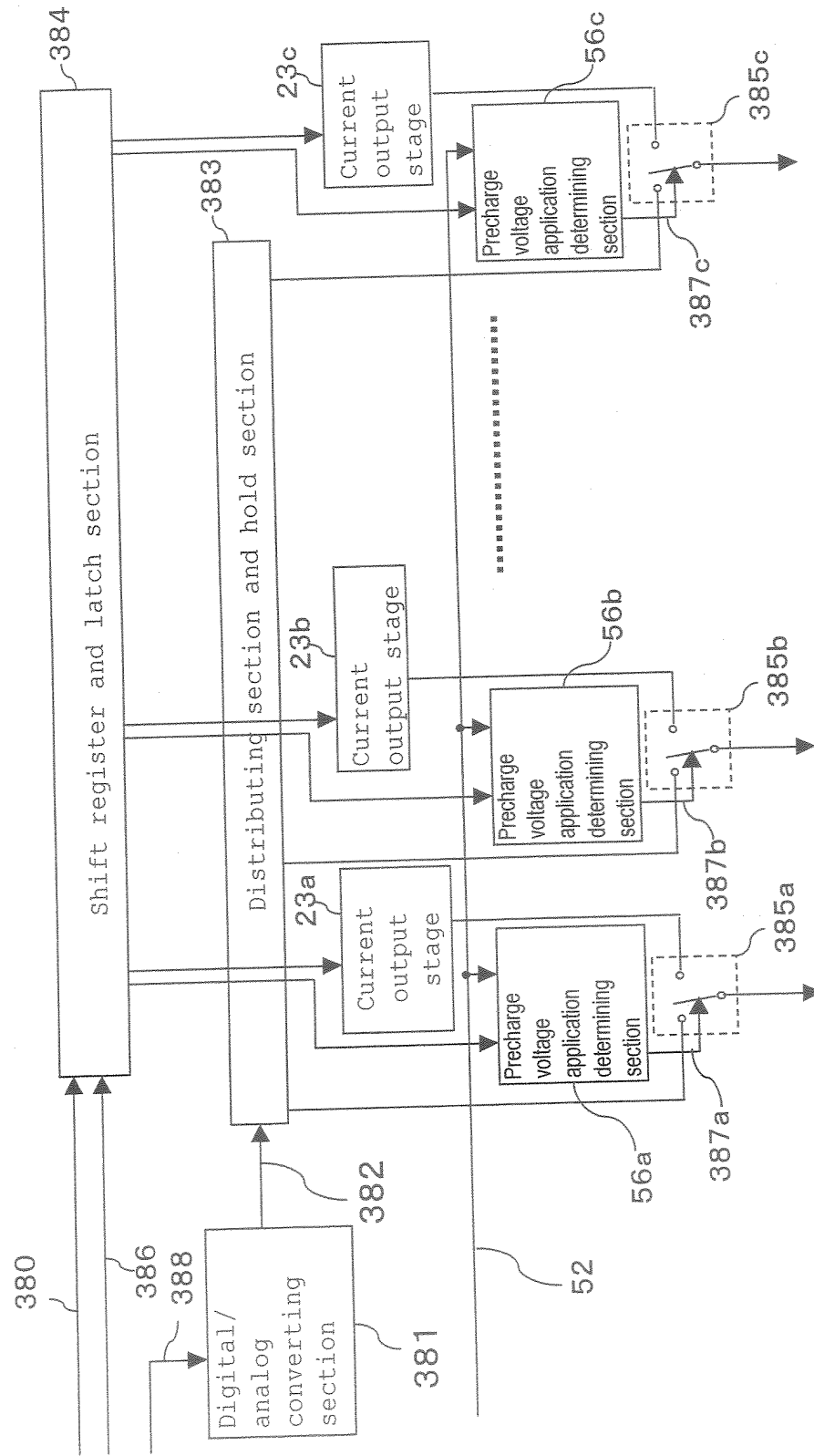


Fig. 39

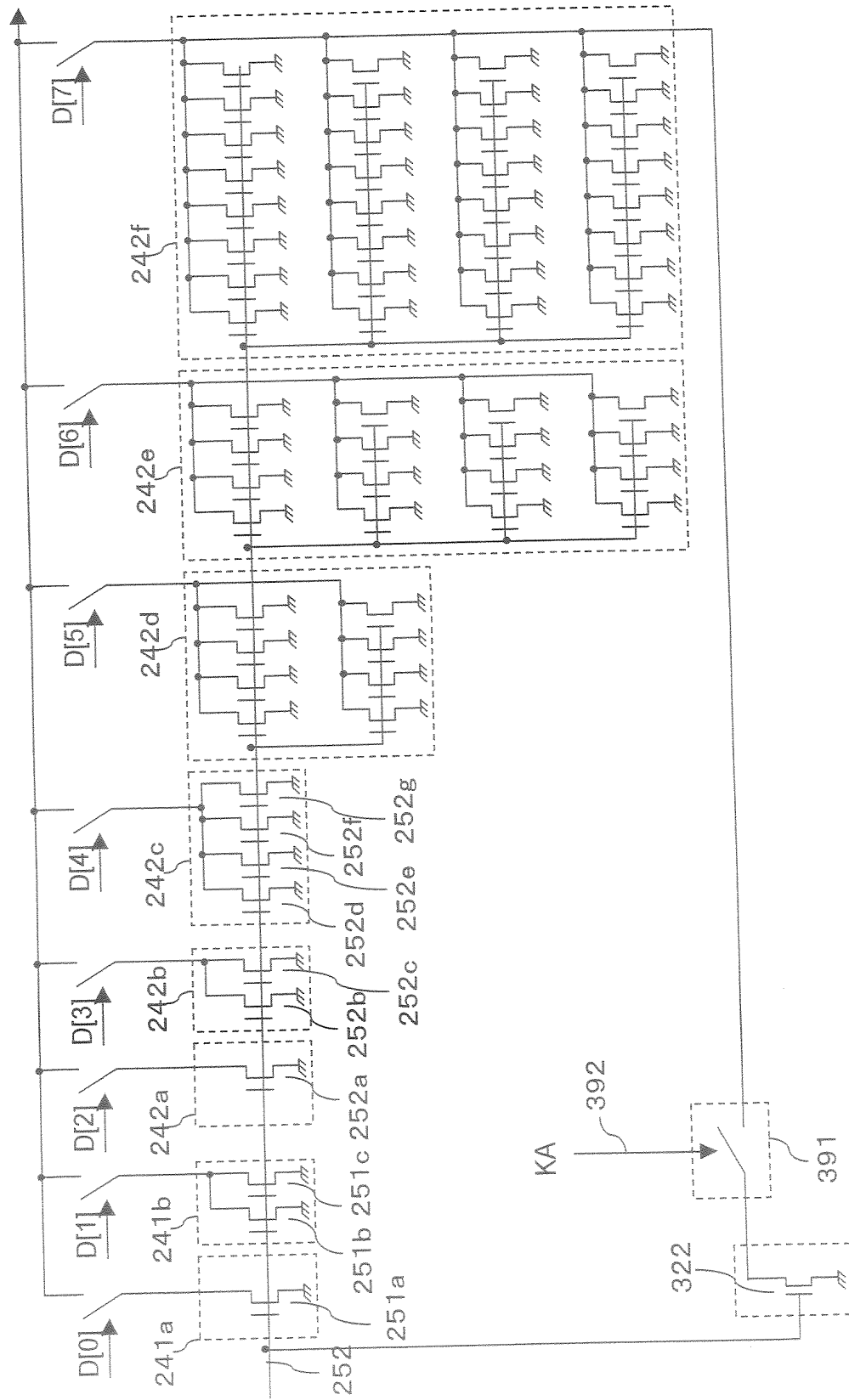


Fig. 40

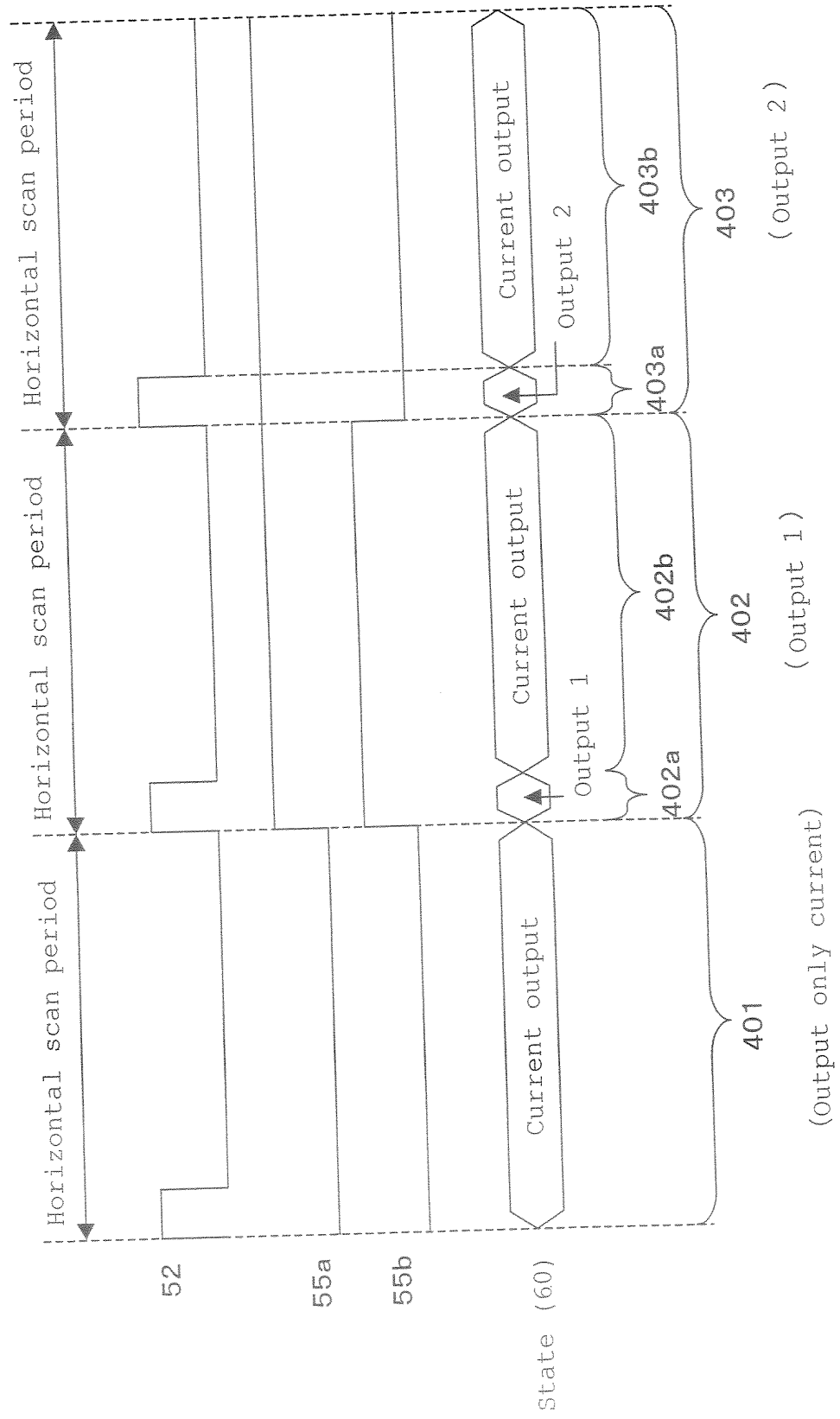
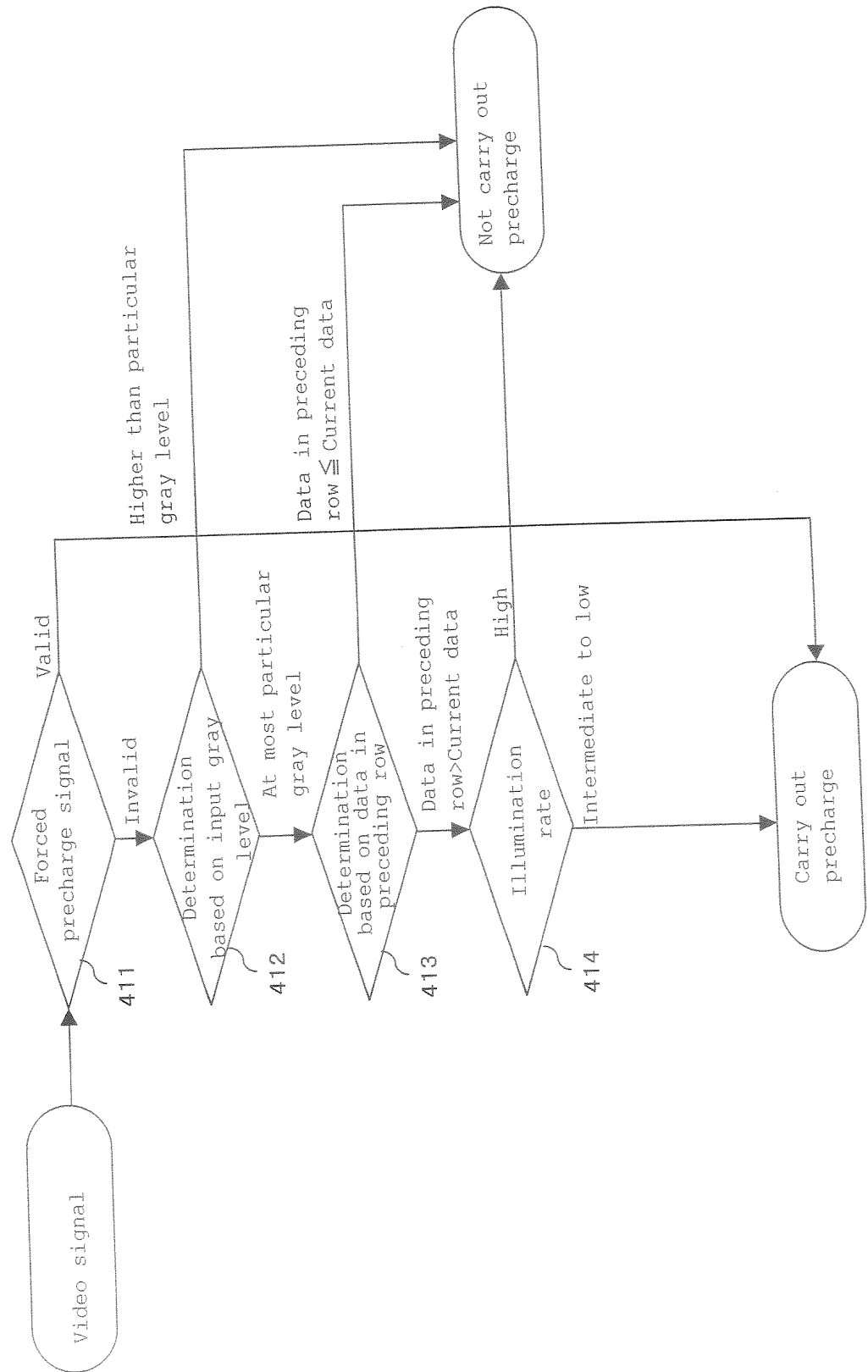


Fig. 41



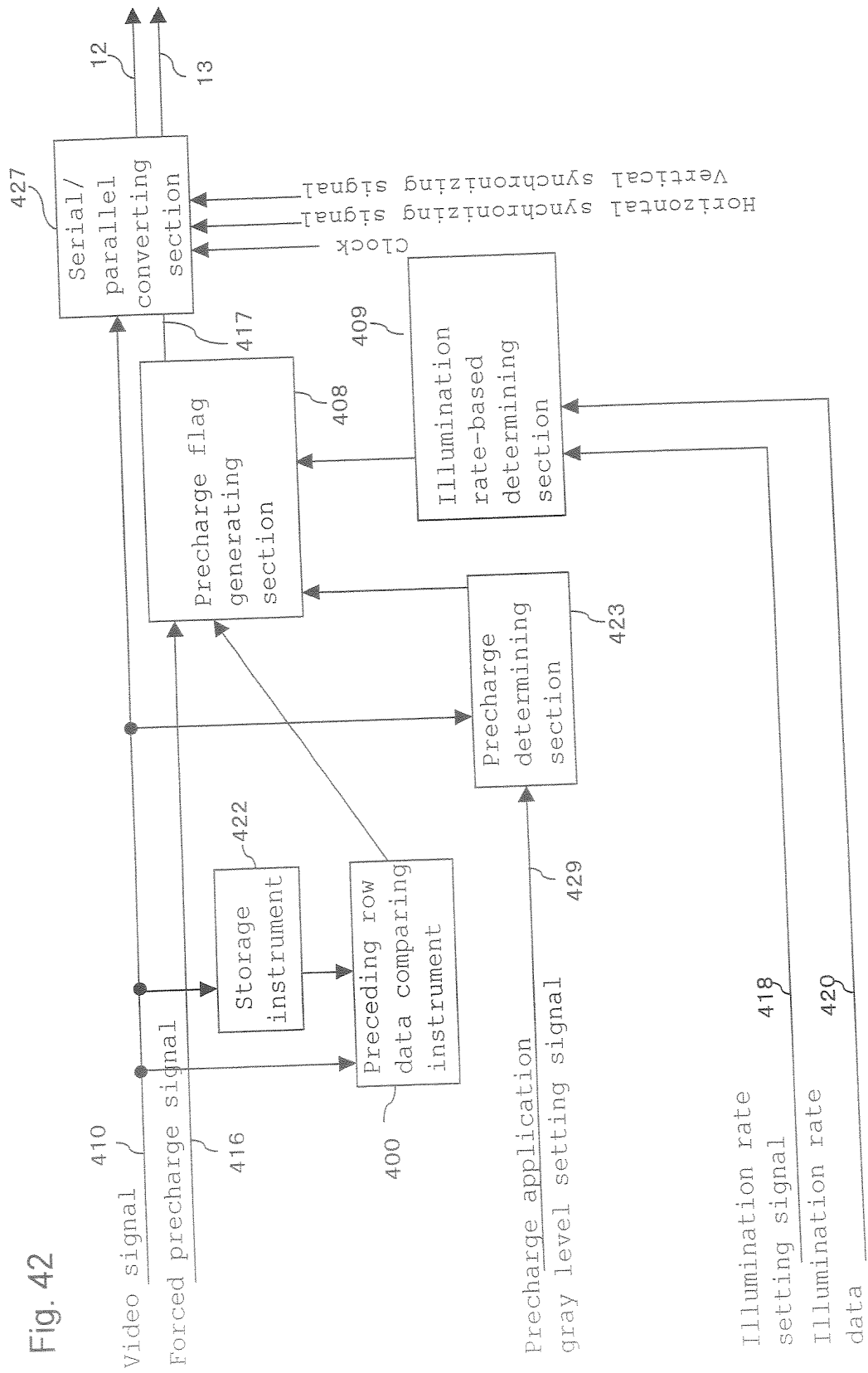


Fig. 43

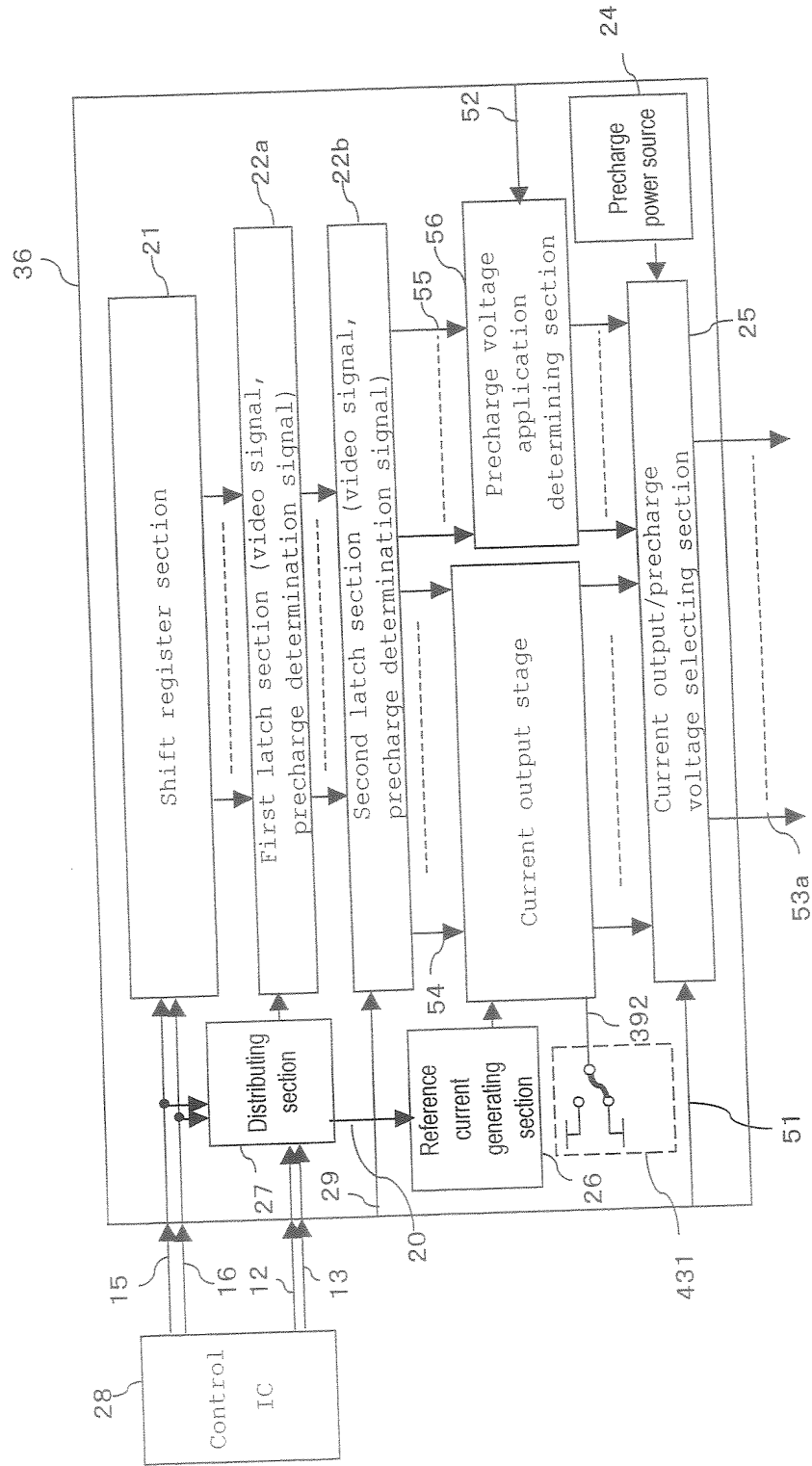
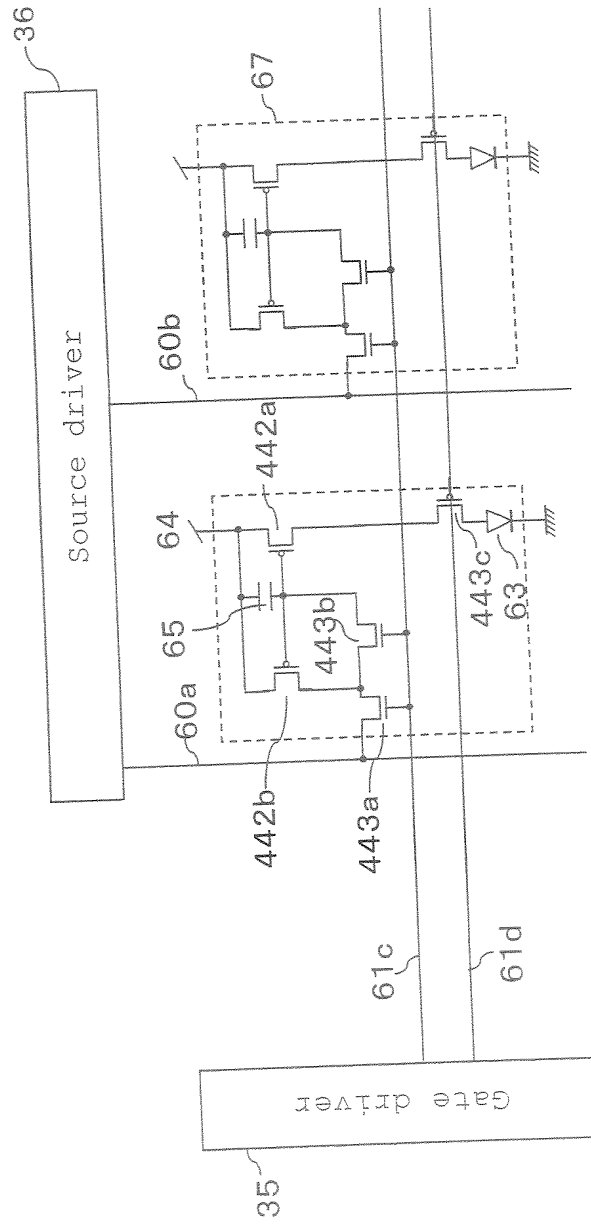


Fig. 44



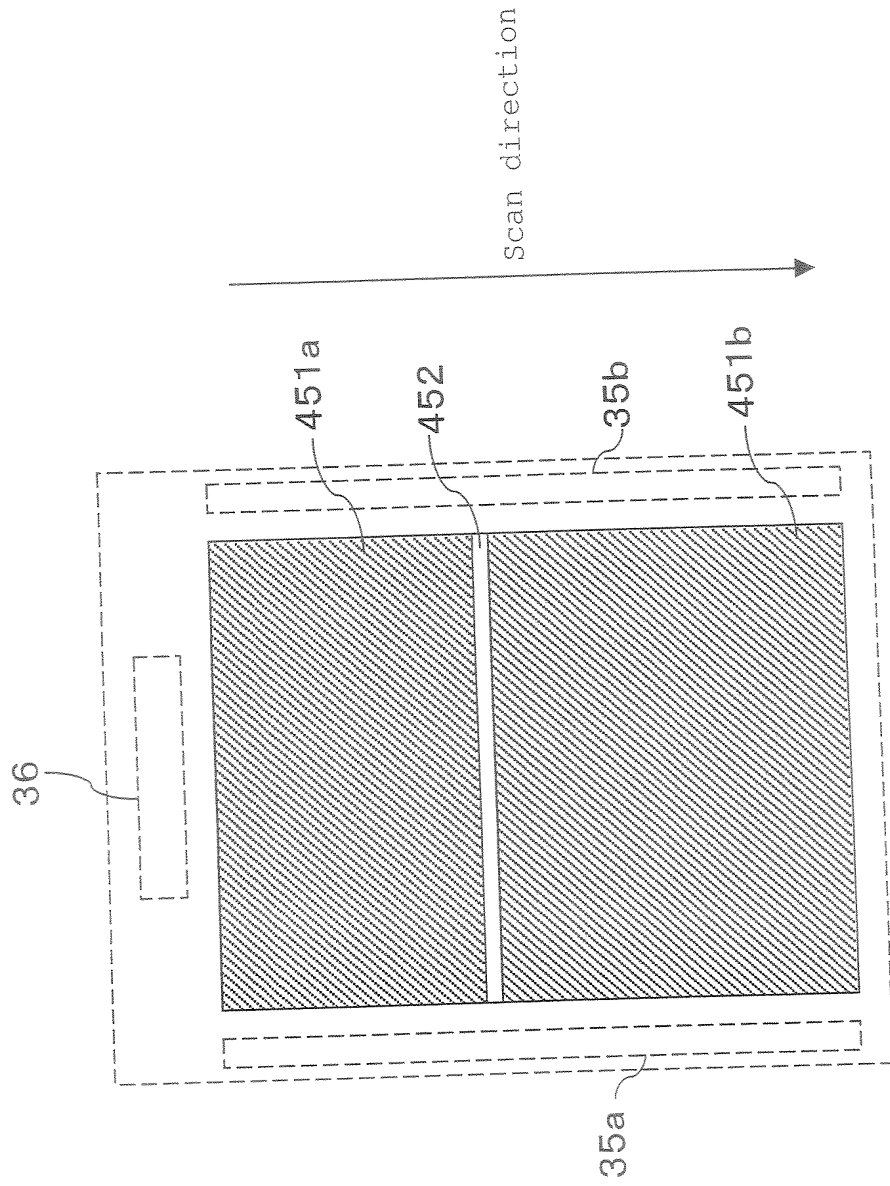


Fig. 45

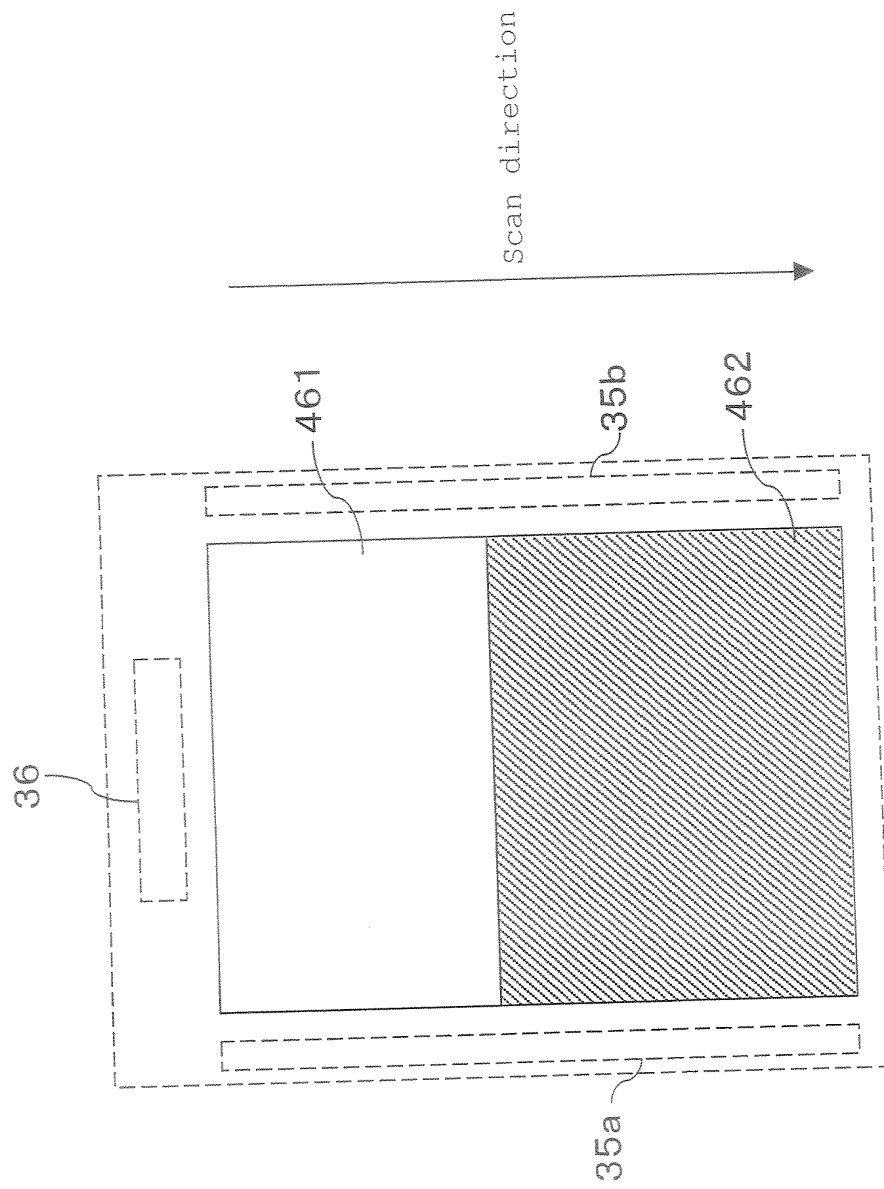


Fig. 46

Fig. 47

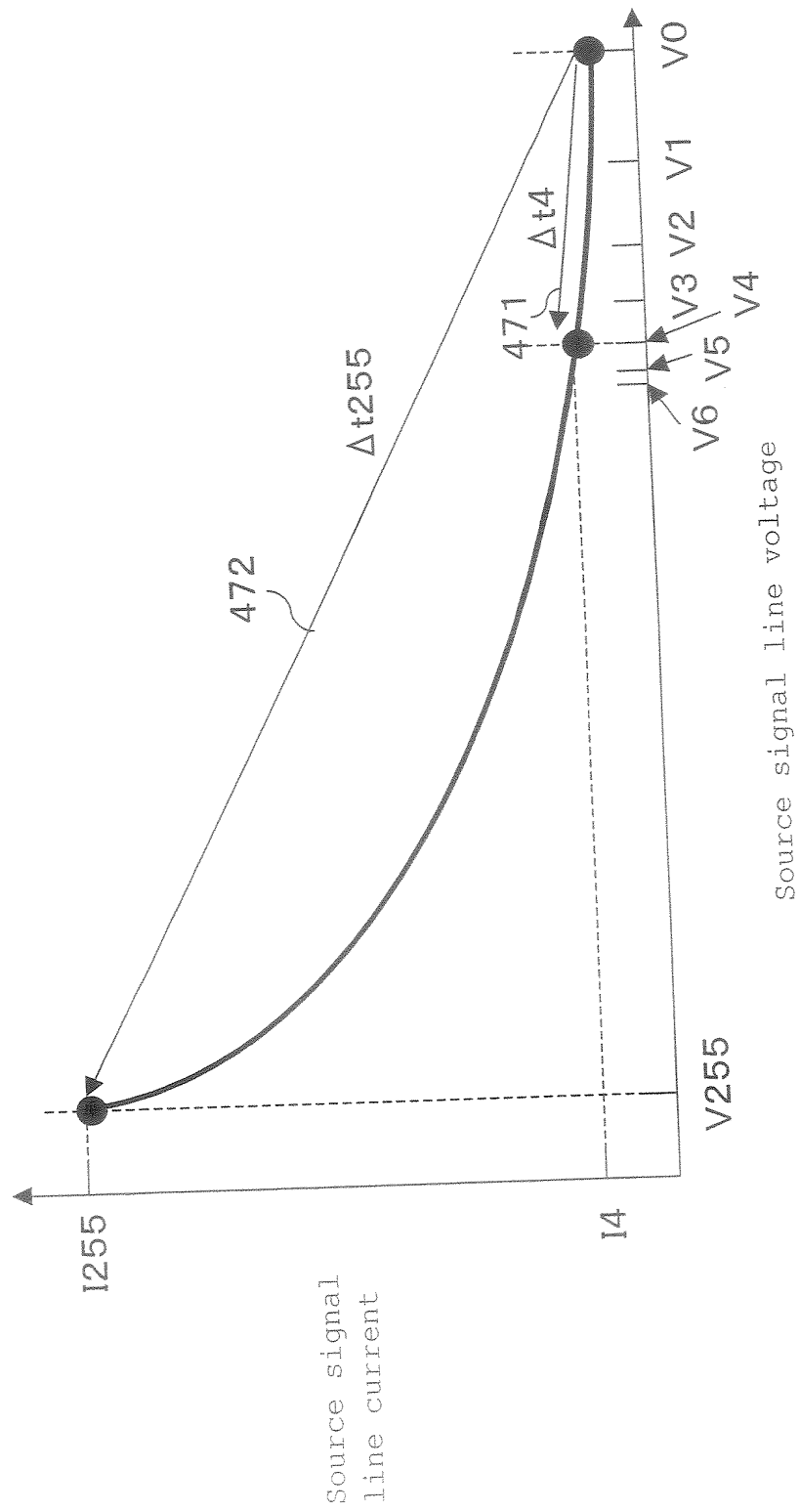


Fig. 48

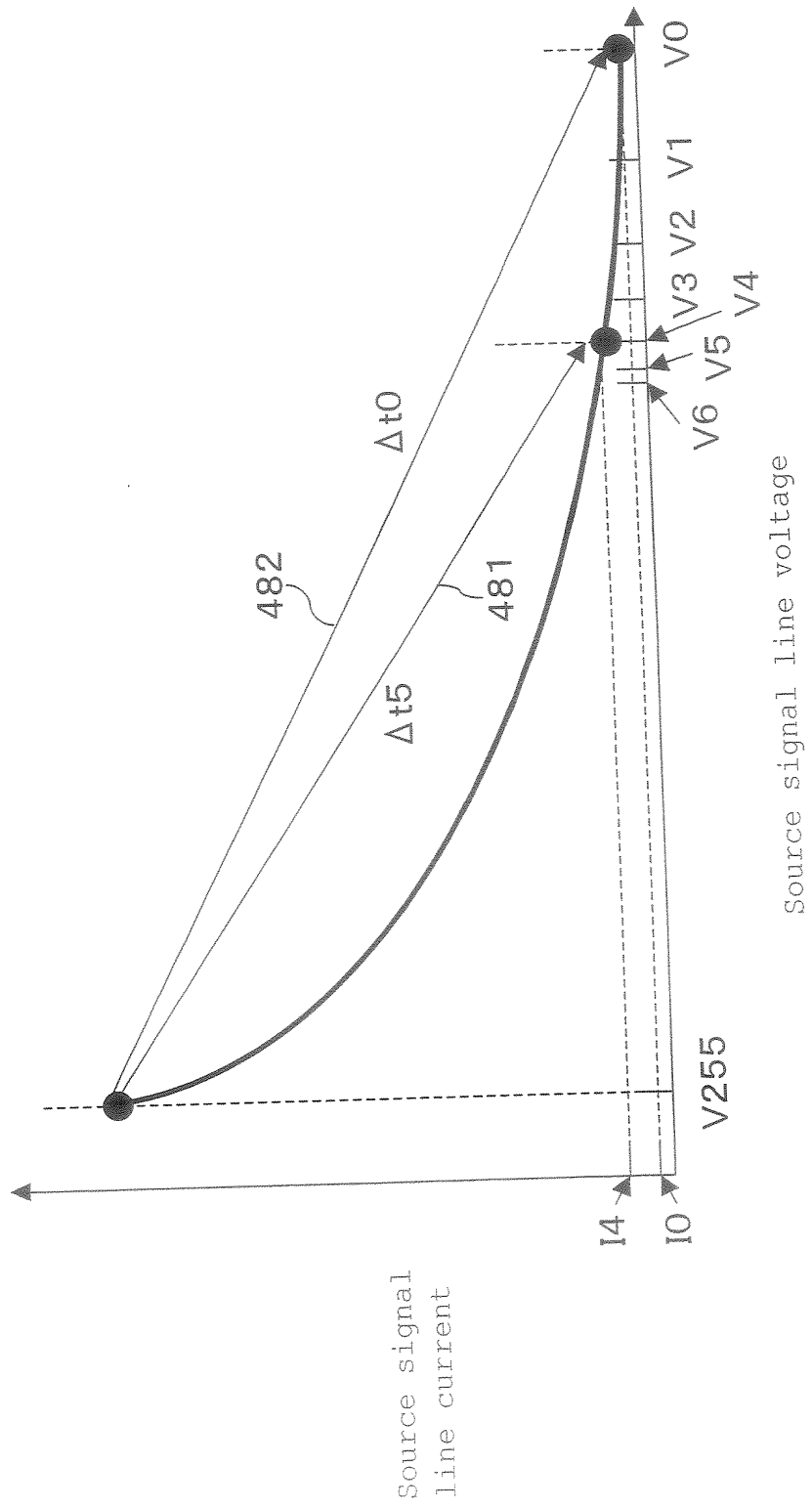
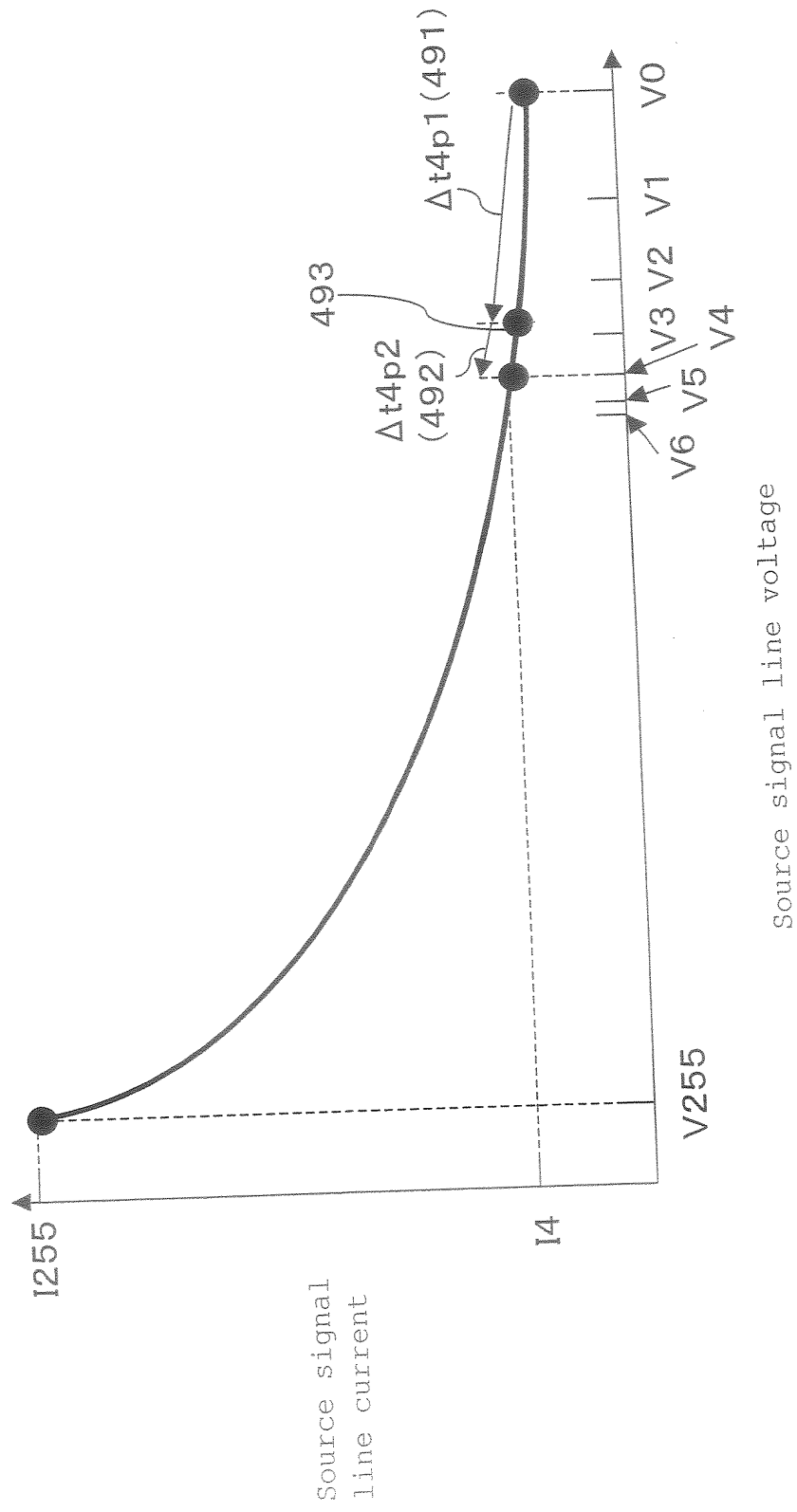


Fig. 49



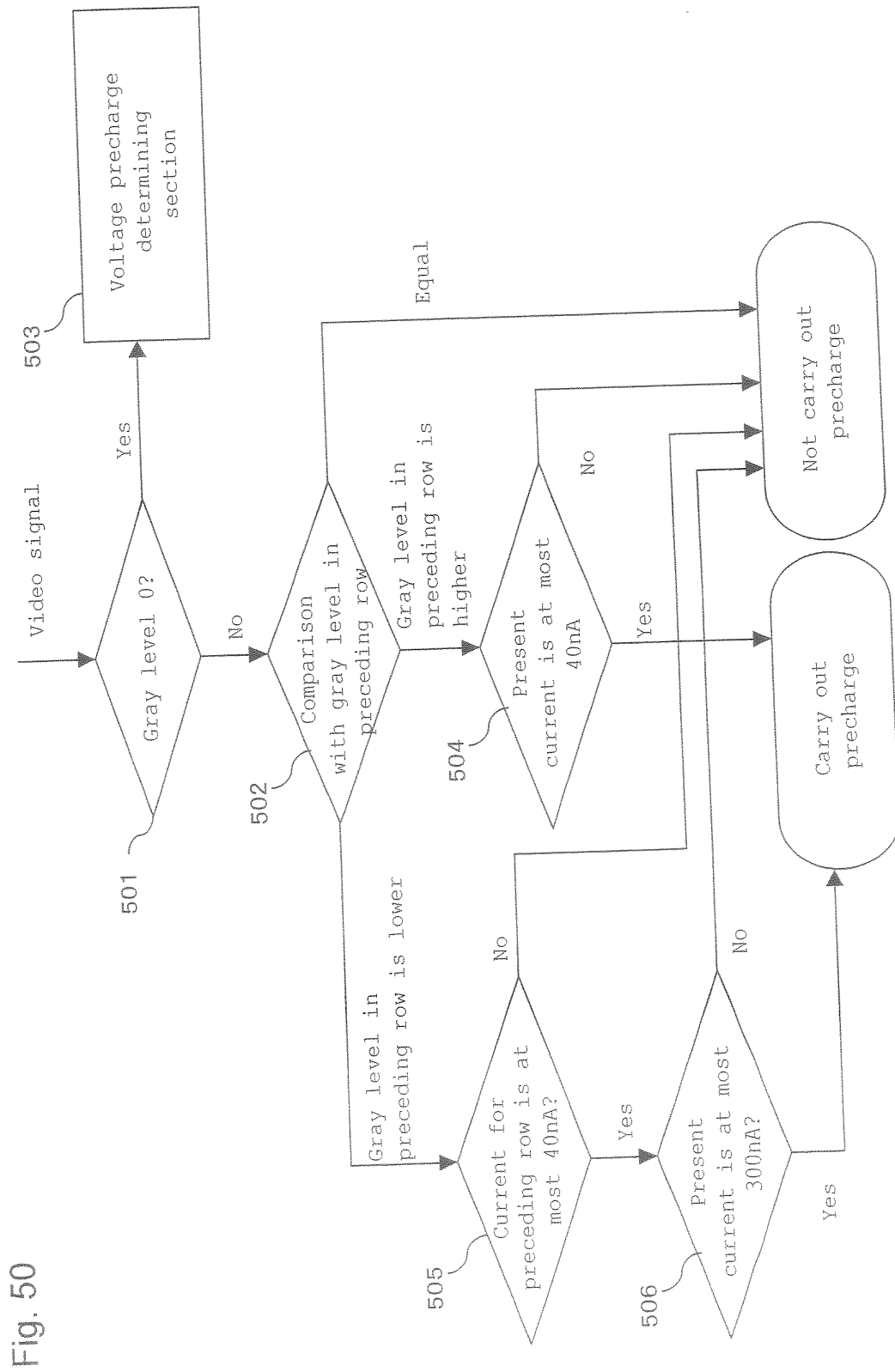


Fig. 51

Gray level of video signal	Data written to memory
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
Equal to or more than 16	15

Fig. 52

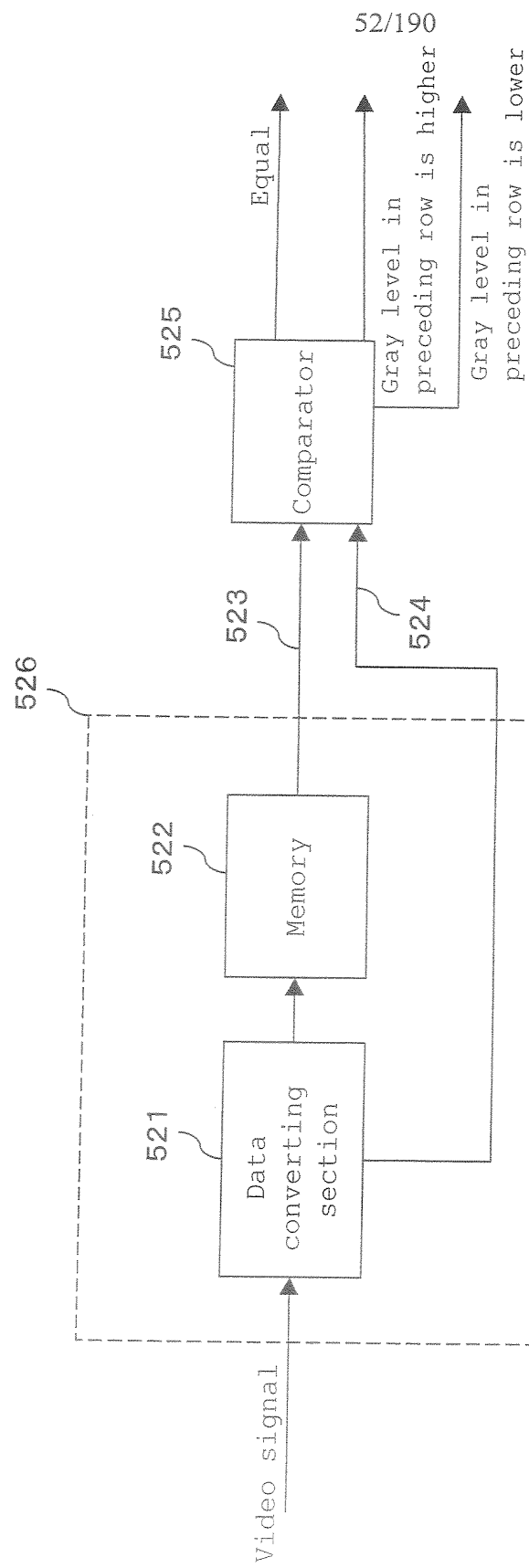


Fig. 53

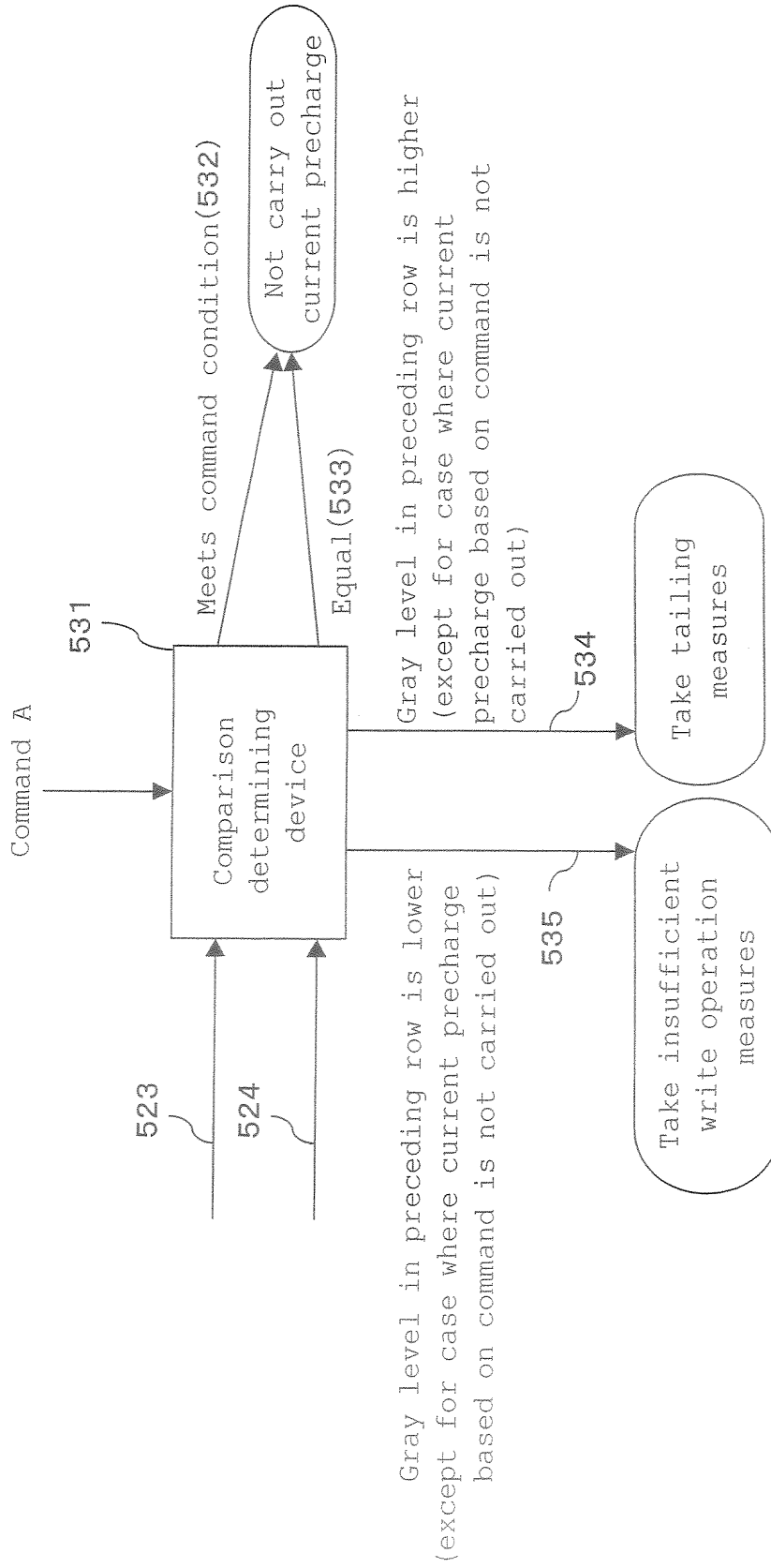


Fig. 54

Value for command A	Operation
0	Not carry out current precharge (for all combinations)
1	Not carry out current precharge if difference in gray level from data in preceding row is 1
2	Not carry out current precharge if difference in gray level from data in preceding row is 1 but carry out current precharge if change is from gray level 0 to gray level 1
3	Not carry out current precharge if difference in gray level from data in preceding row is at most 2
4	Not carry out current precharge if difference in gray level from data in preceding row is at most 2 but carry out current precharge if change is from gray level 0 to gray level 2

Fig. 55

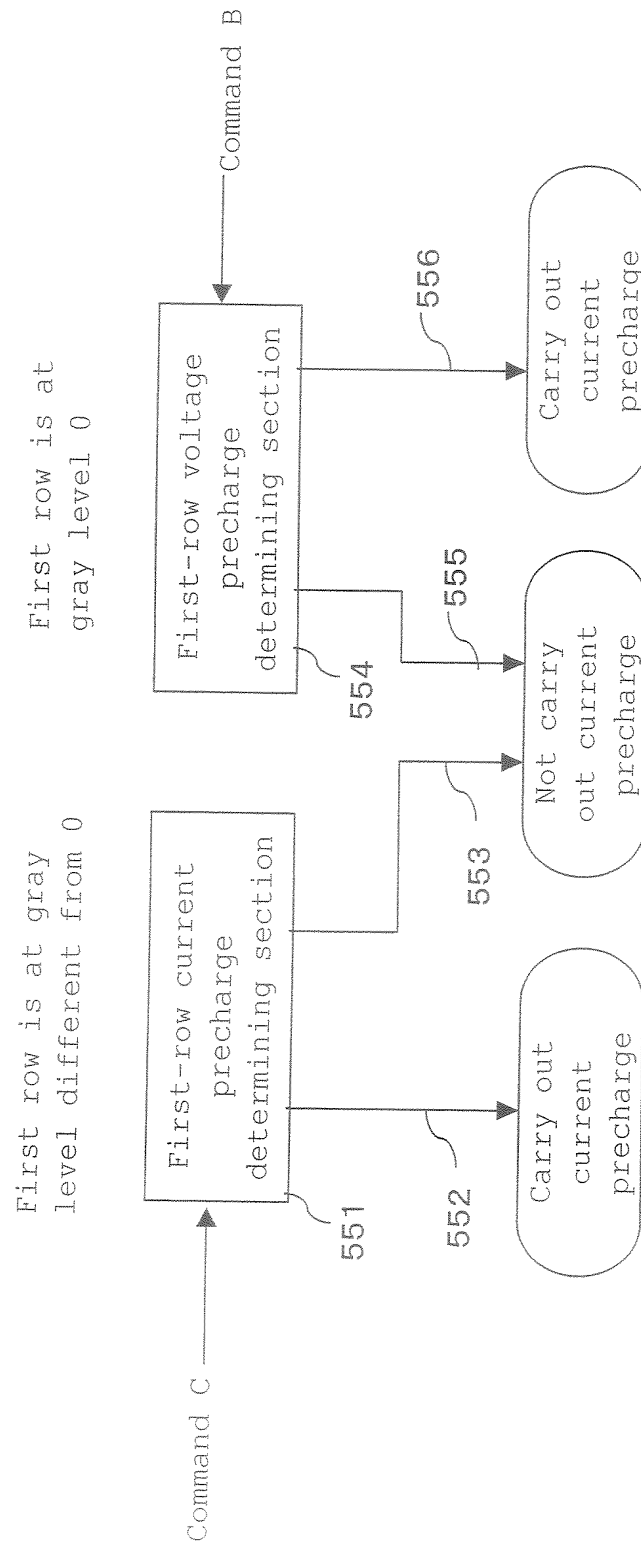


Fig. 56

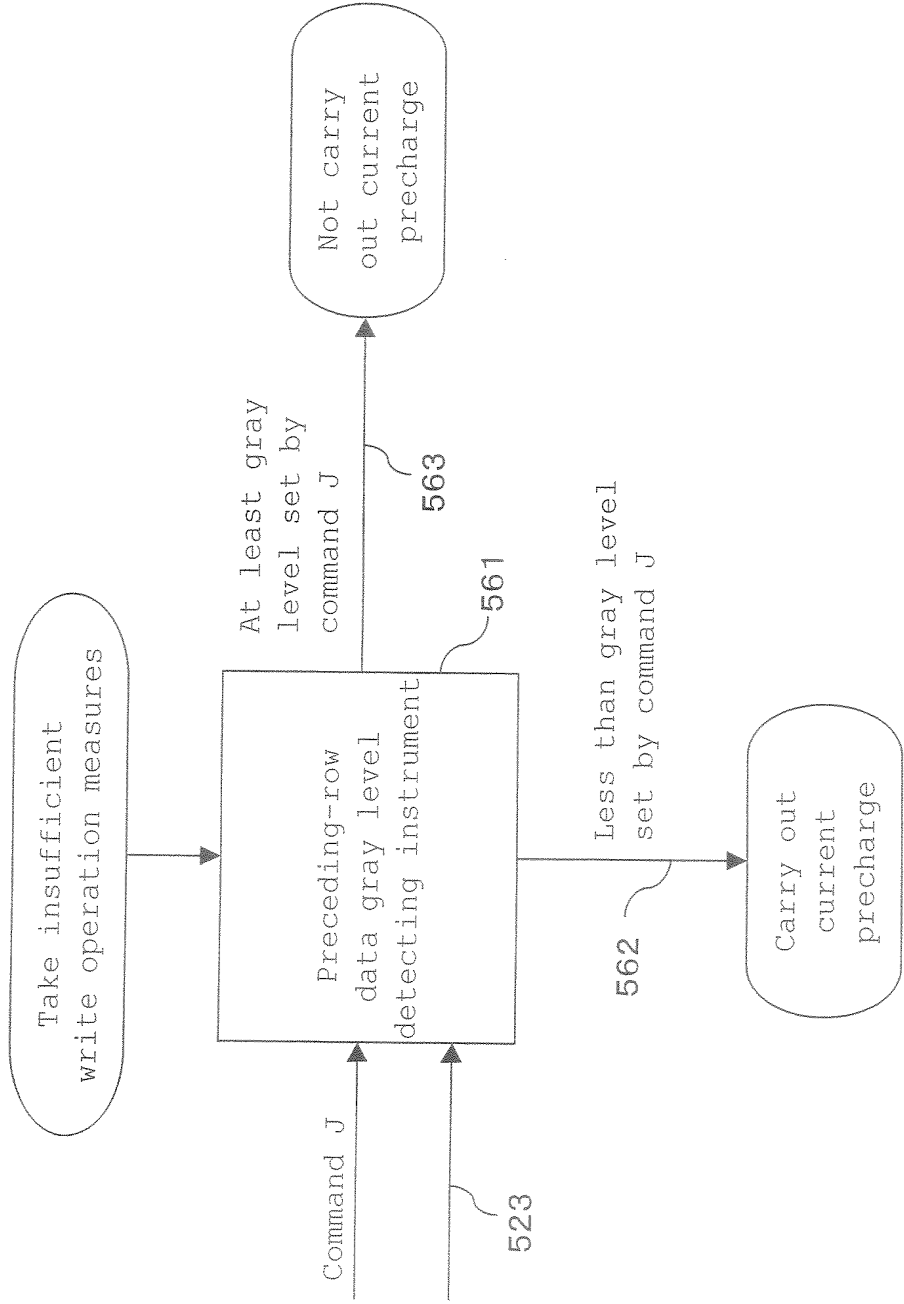


Fig. 57

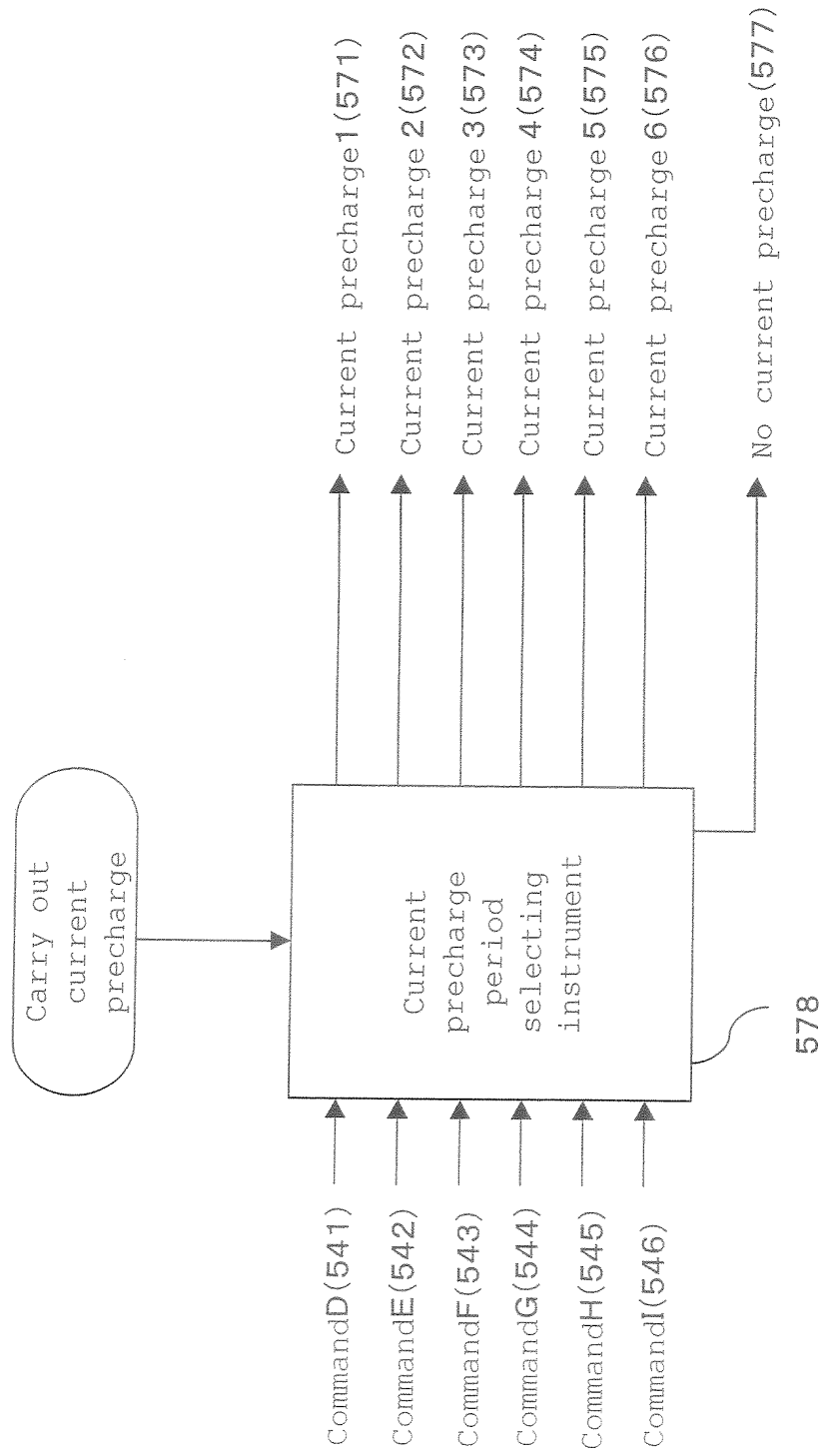


Fig. 58

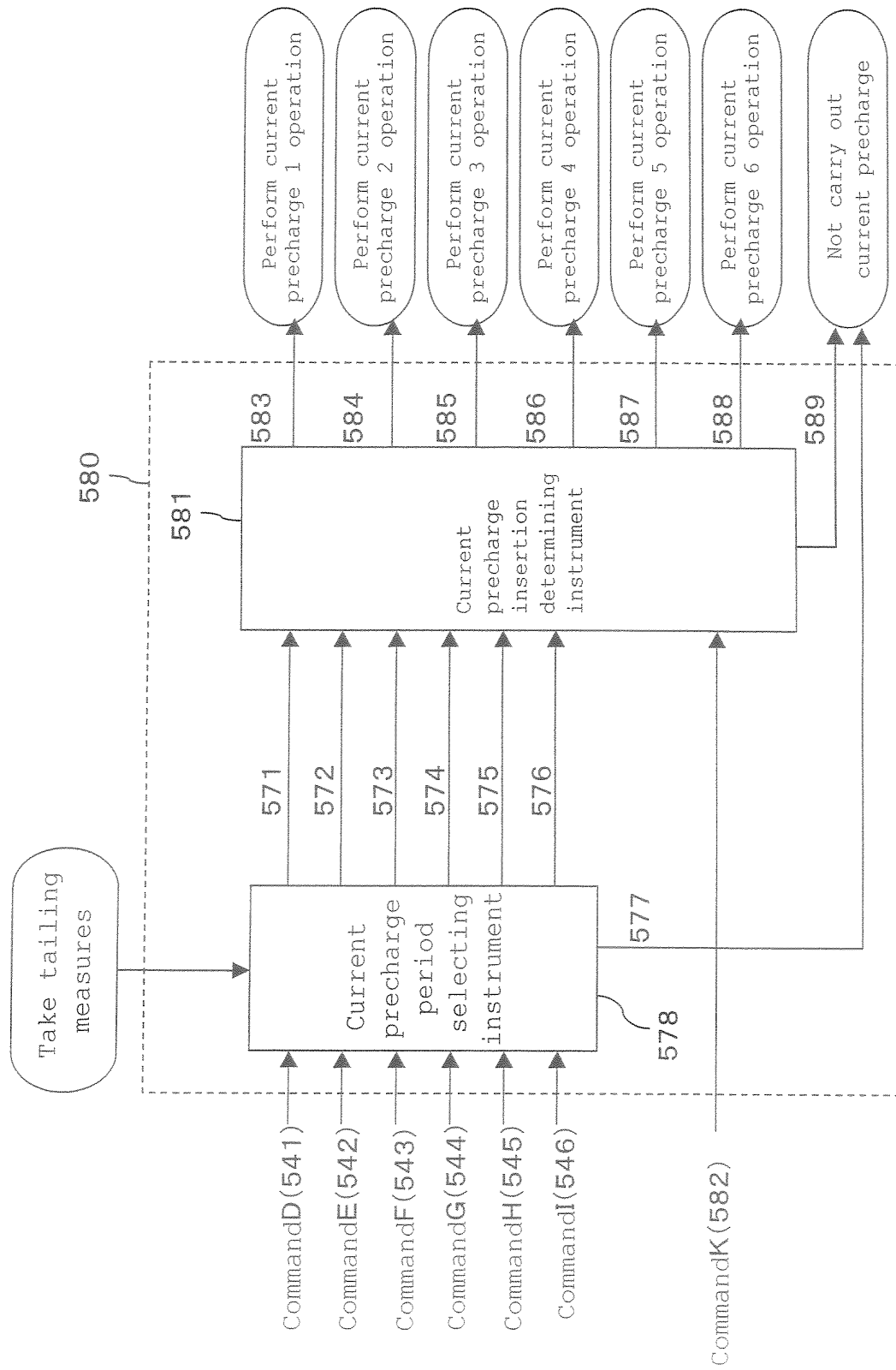


Fig. 59

Value for command K	Precharge pattern
0	Same as input current precharge pattern
1	
2	Not carry out current precharge for current recharge 6 operation and same as input current precharge pattern in other cases
3	Not carry out current precharge for current precharge 5 or 6 operation and same as input current precharge pattern in other cases
4	Not carry out current precharge for current precharge 4 to 6 operations and same as input current precharge pattern in other cases
5	Not carry out current precharge for current precharge 3 to 6 operations and same as input current precharge pattern in other cases
6	Not carry out current precharge for current precharge 2 to 6 operations and same as input current precharge pattern in other cases
7	Not carry out current precharge

Fig. 60

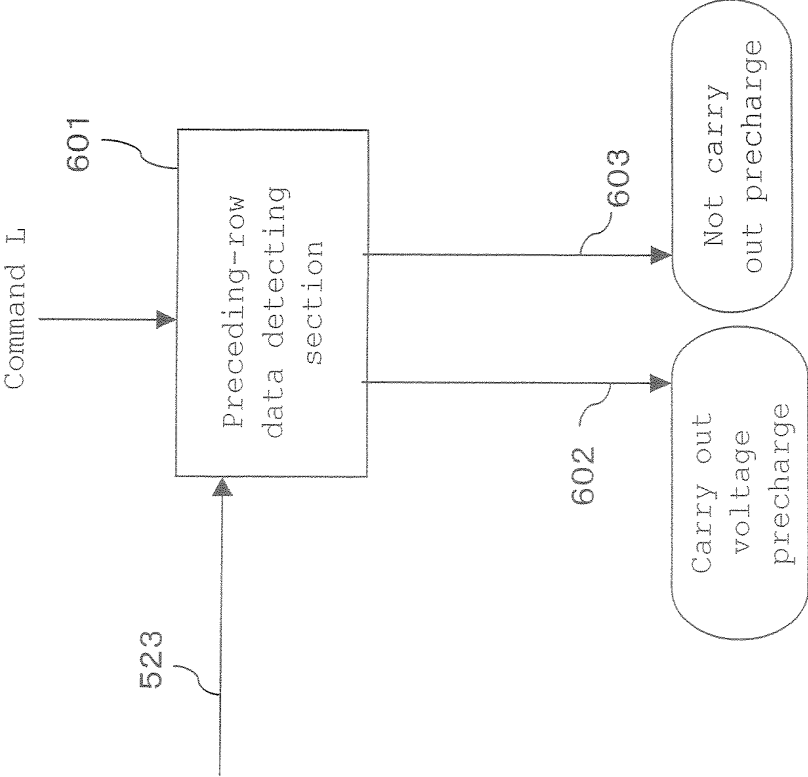


Fig. 61

Value for command L	Precharge pattern
0	Not carry out voltage precharge
1	Carry out voltage precharge when data in preceding row is 0
2	Always carry out voltage precharge

Fig. 62

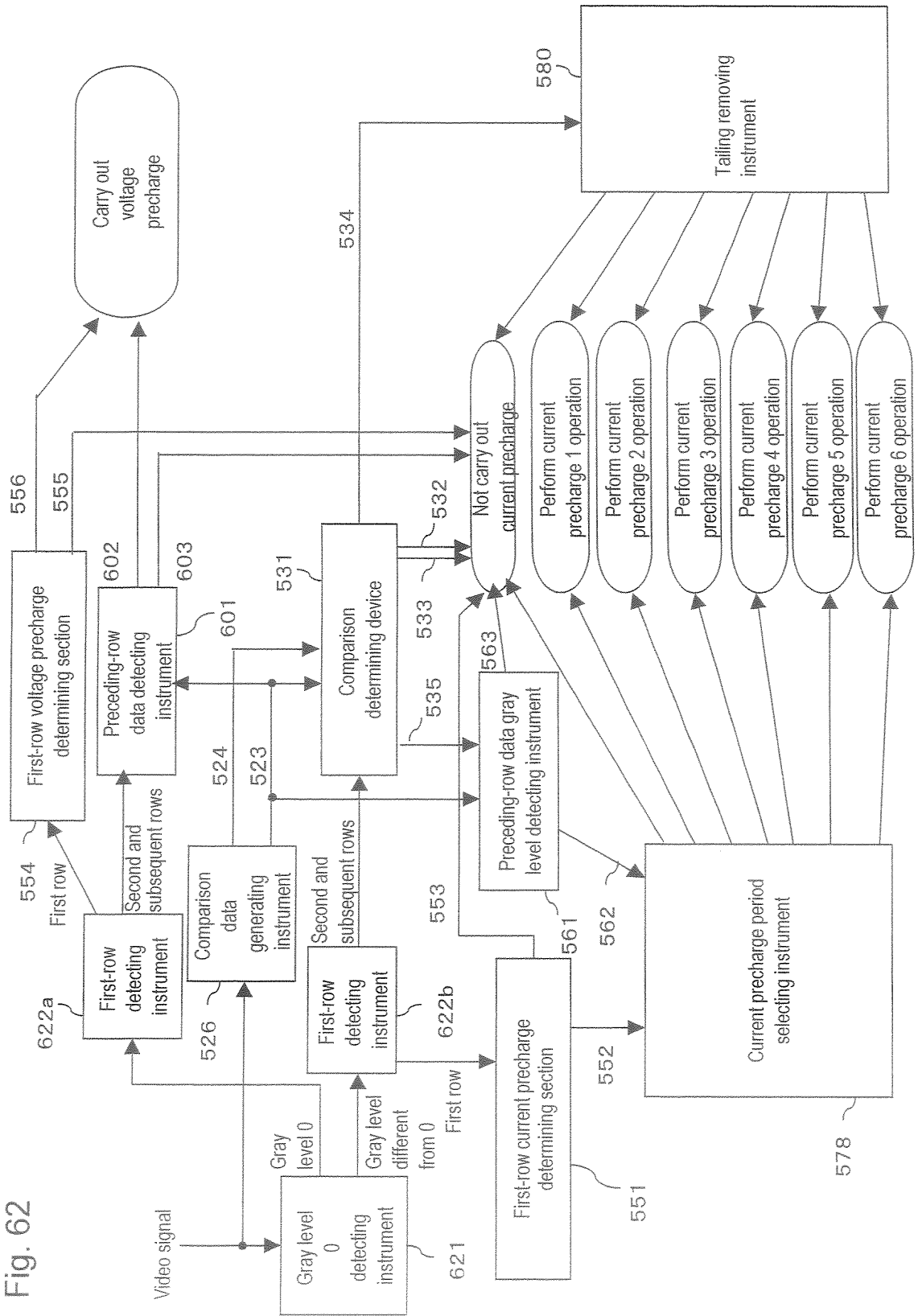


Fig. 63

Determination for precharge operation	Value for precharge determination signal (55)
Not carry out precharge	0
Perform current precharge 1 operation	1
Perform current precharge 2 operation	2
Perform current precharge 3 operation	3
Perform current precharge 4 operation	4
Perform current precharge 5 operation	5
Perform current precharge 6 operation	6
Carry out voltage precharge	7

Fig. 65

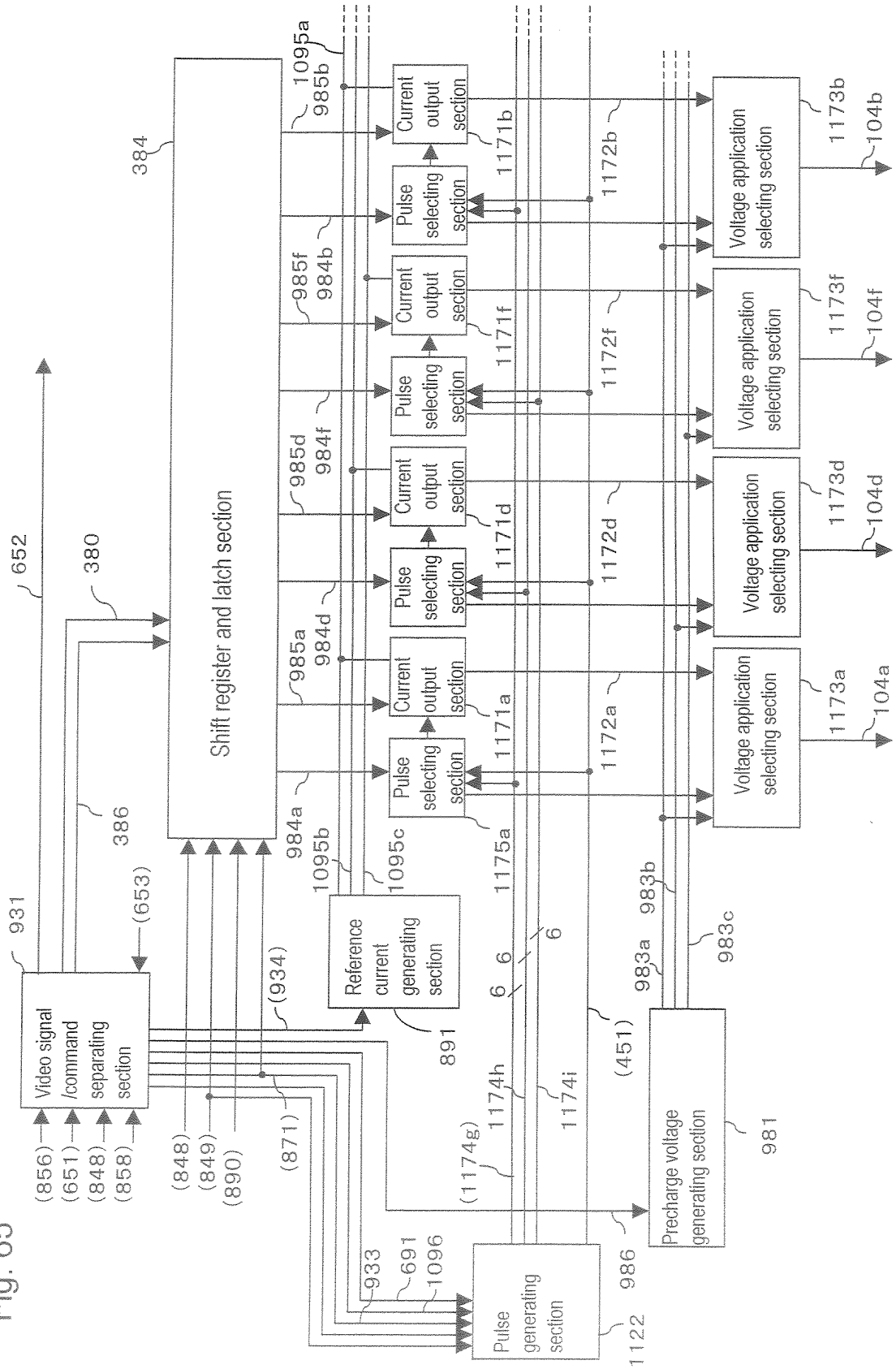


Fig. 66

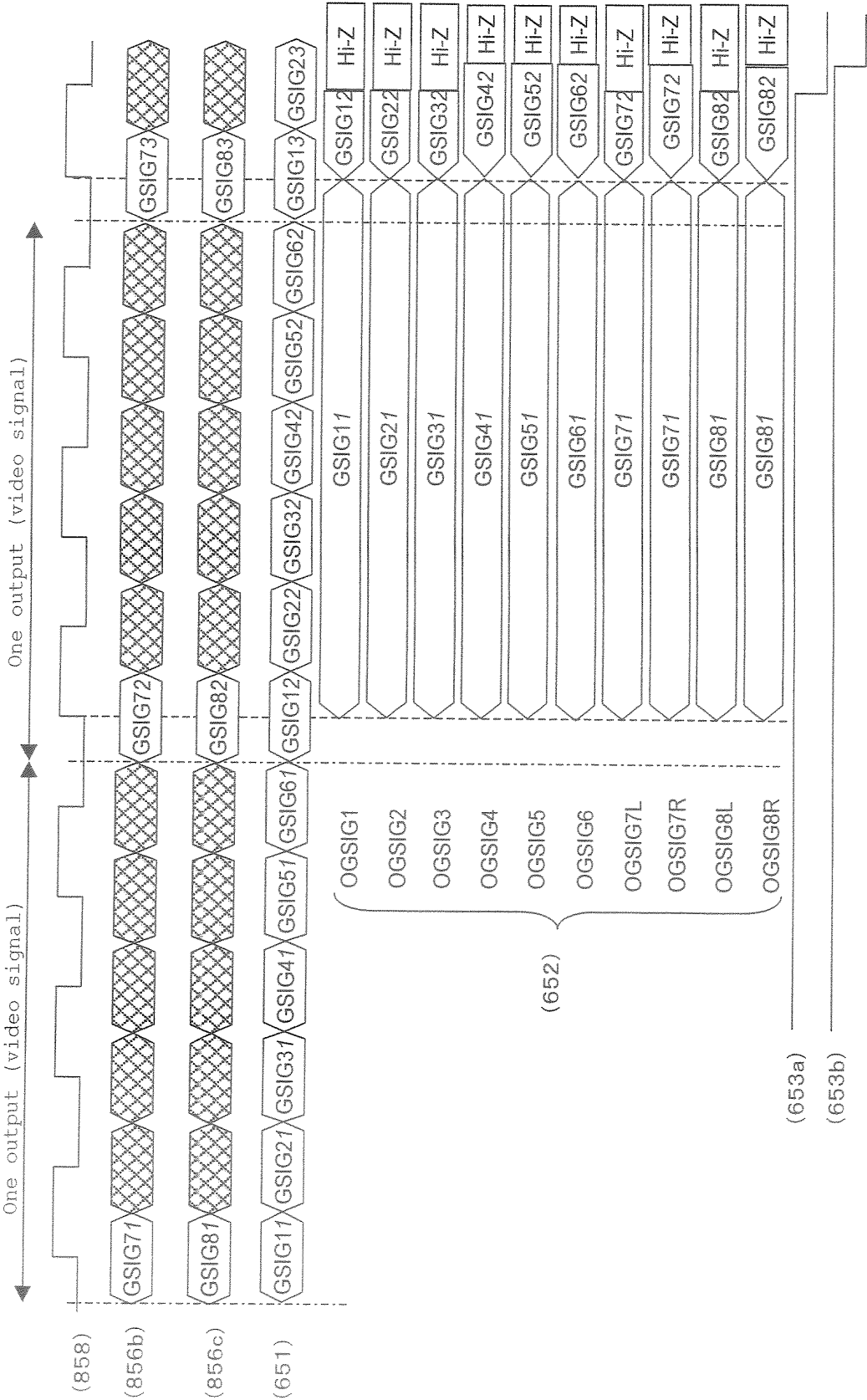


Fig. 67

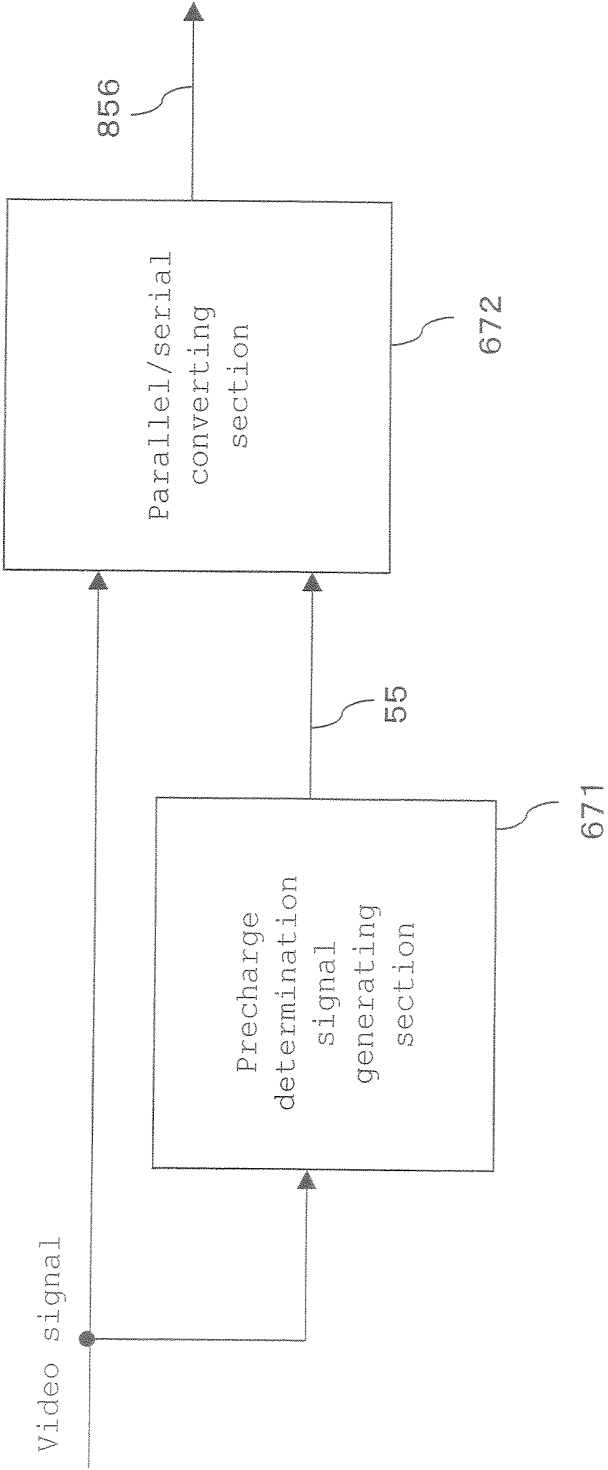


Fig. 68

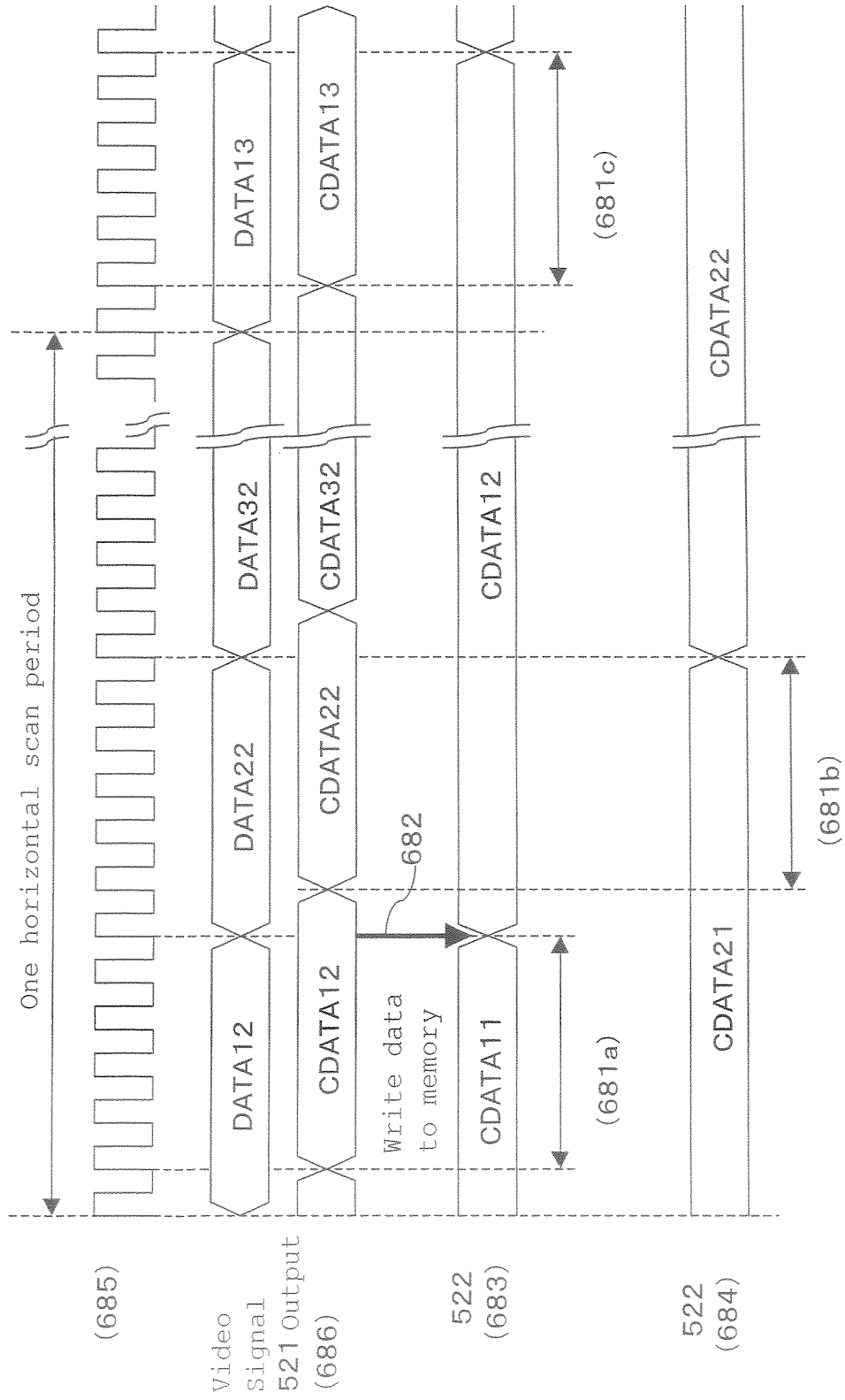


Fig. 69

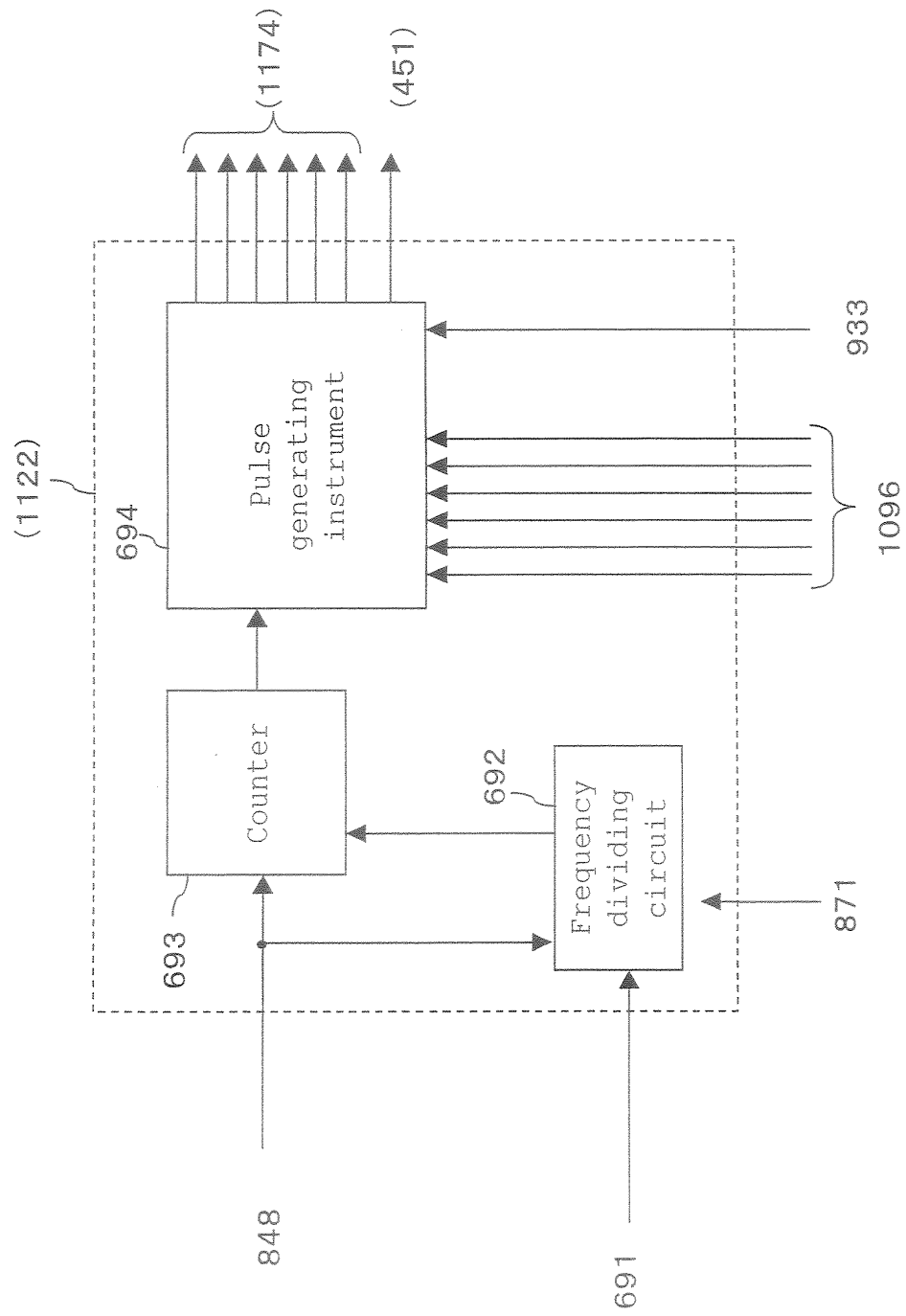


Fig. 70

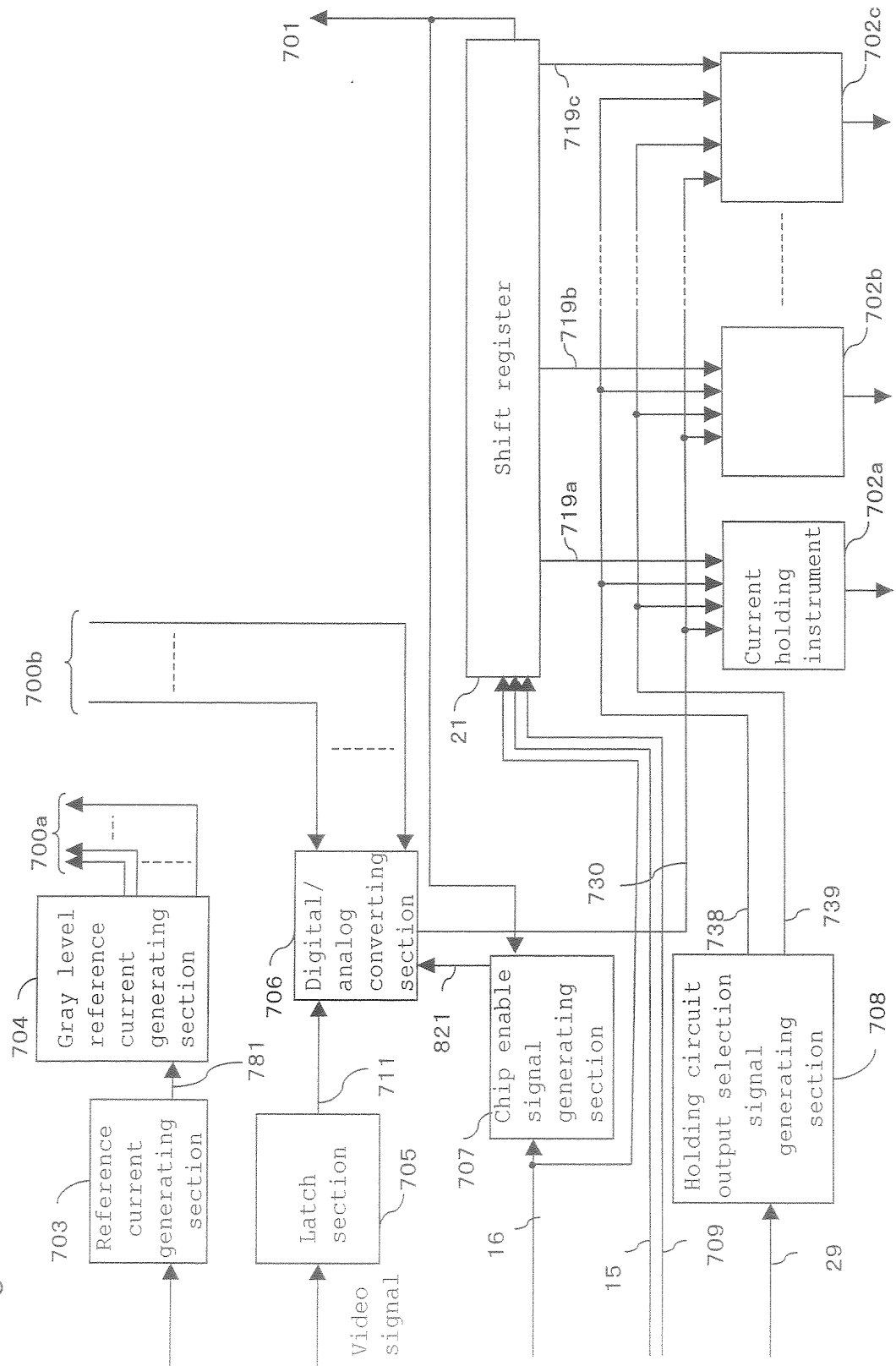


Fig. 71

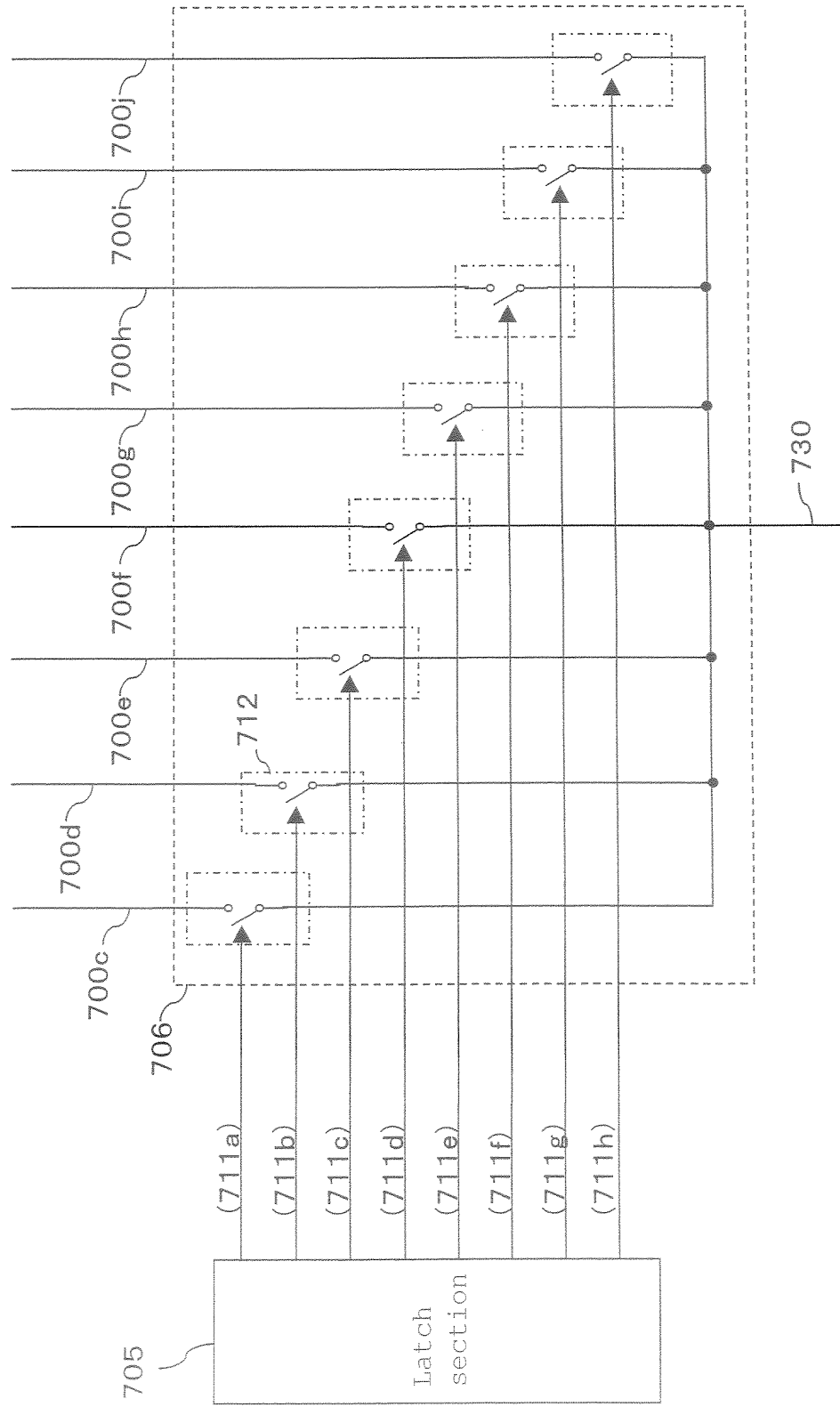


Fig. 72

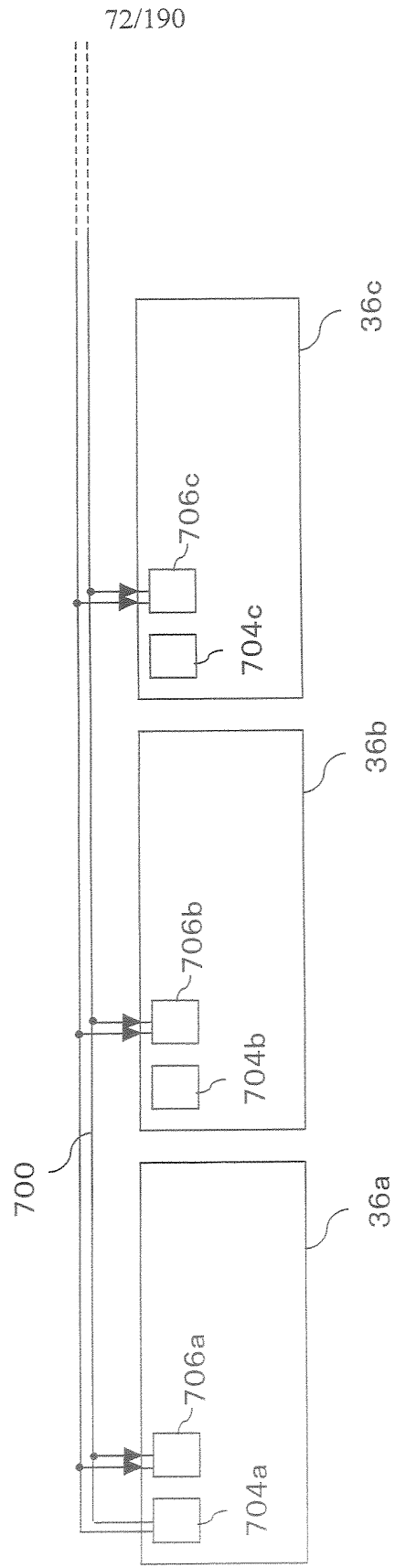


Fig. 73

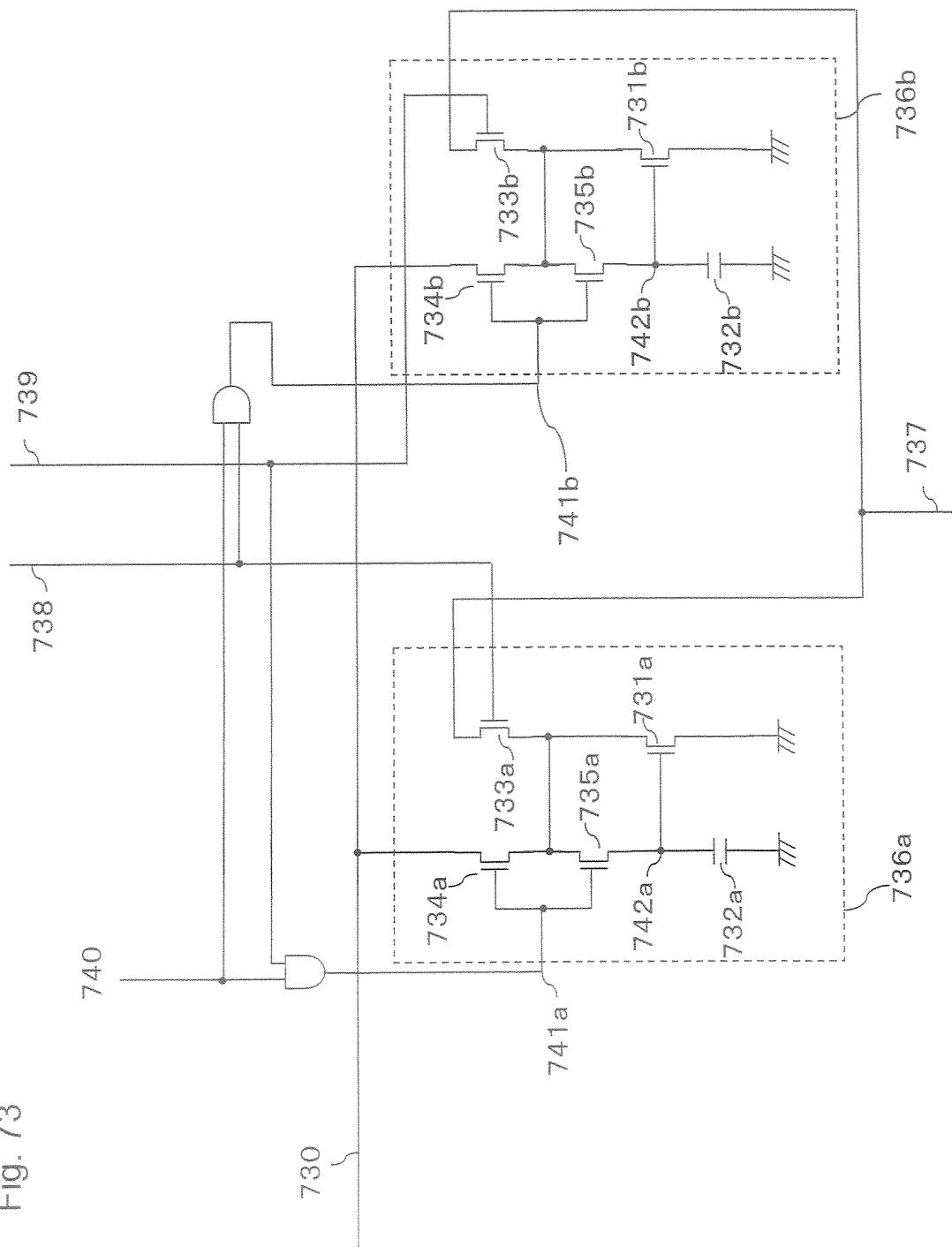
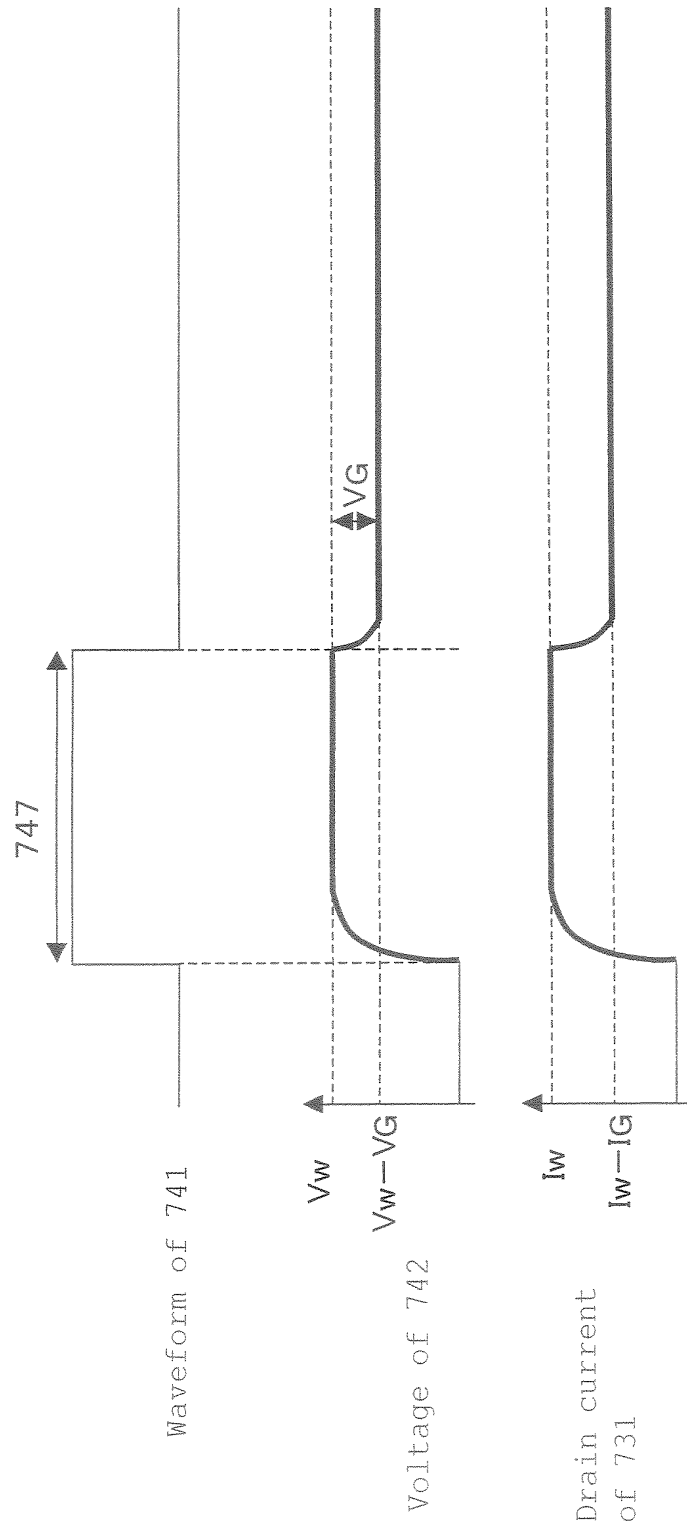


Fig. 74



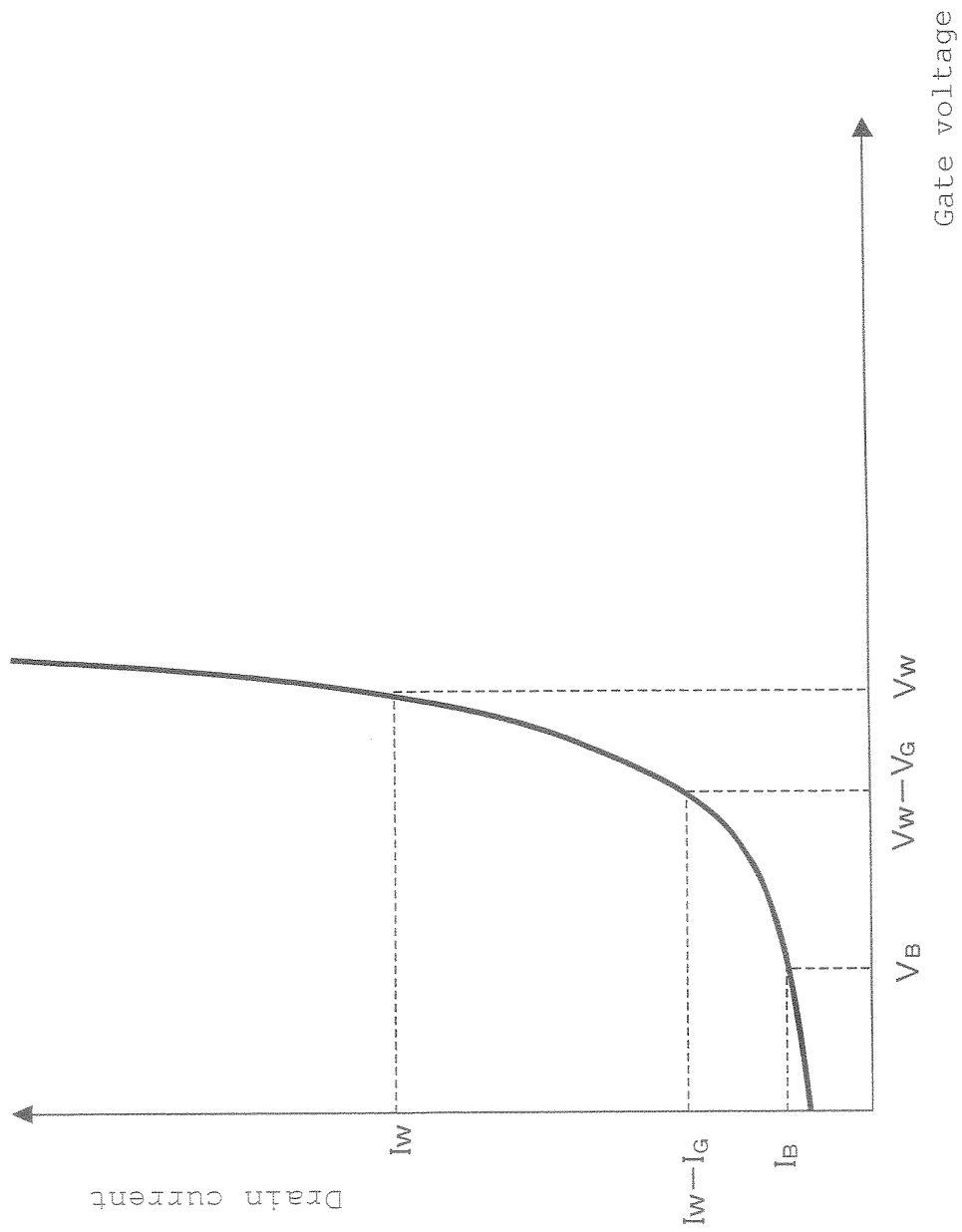


Fig. 75

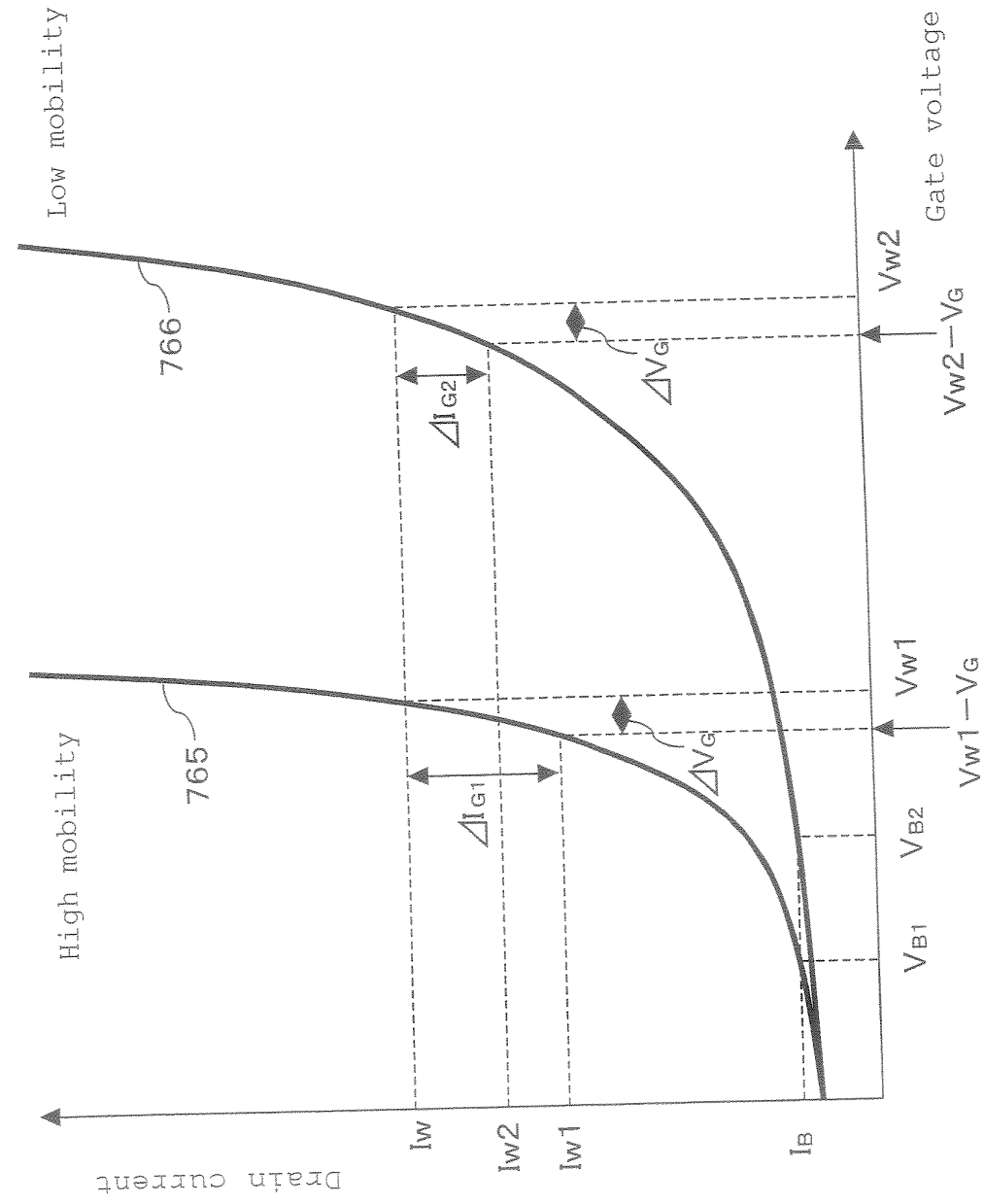


Fig. 76

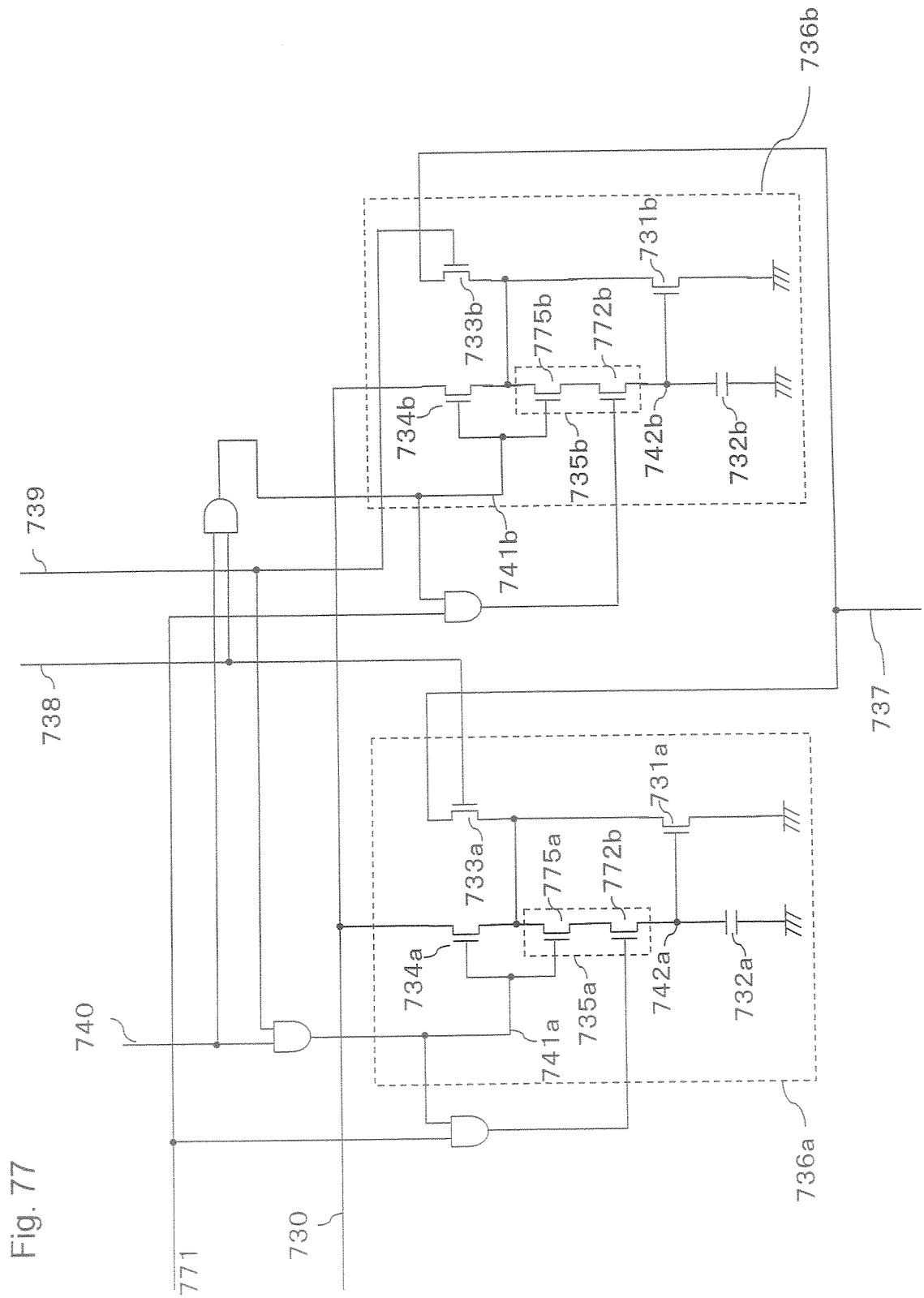


Fig. 78

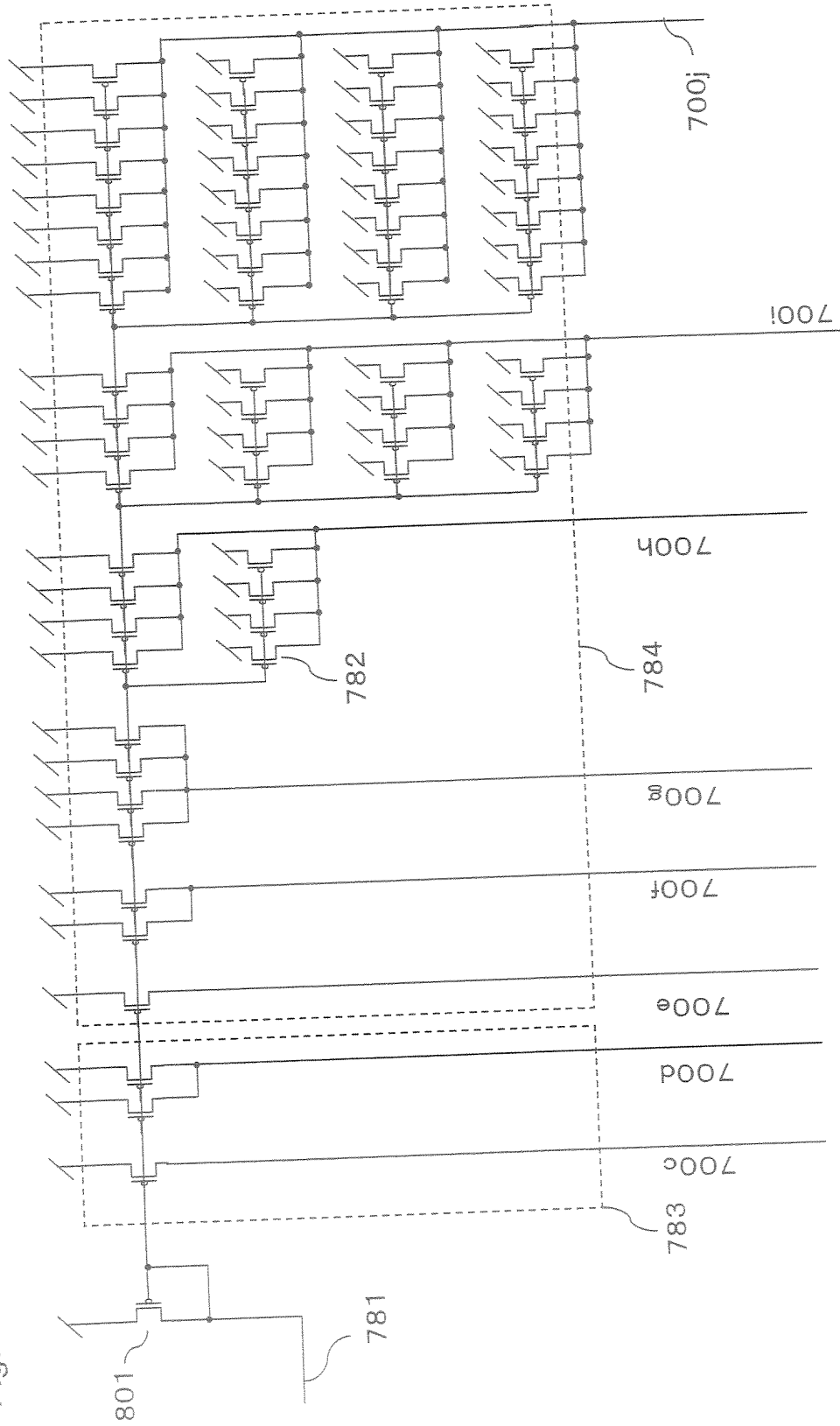


Fig. 79

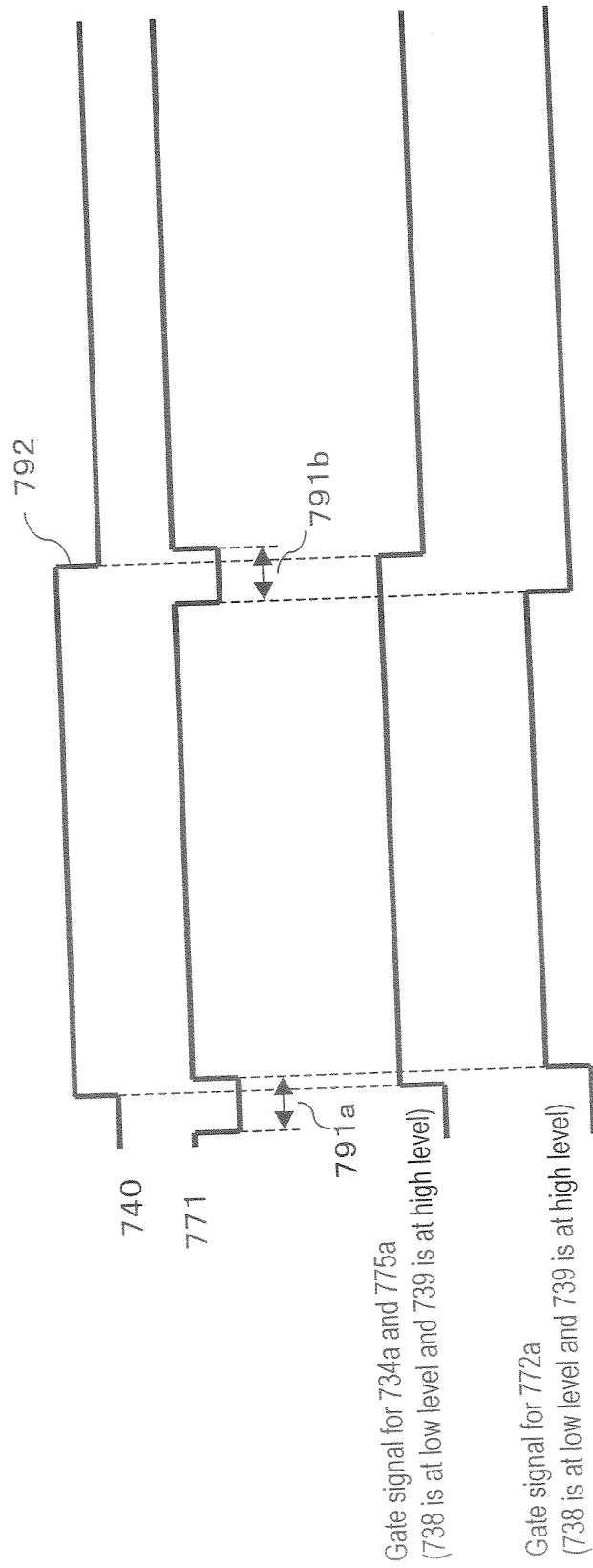


Fig. 80

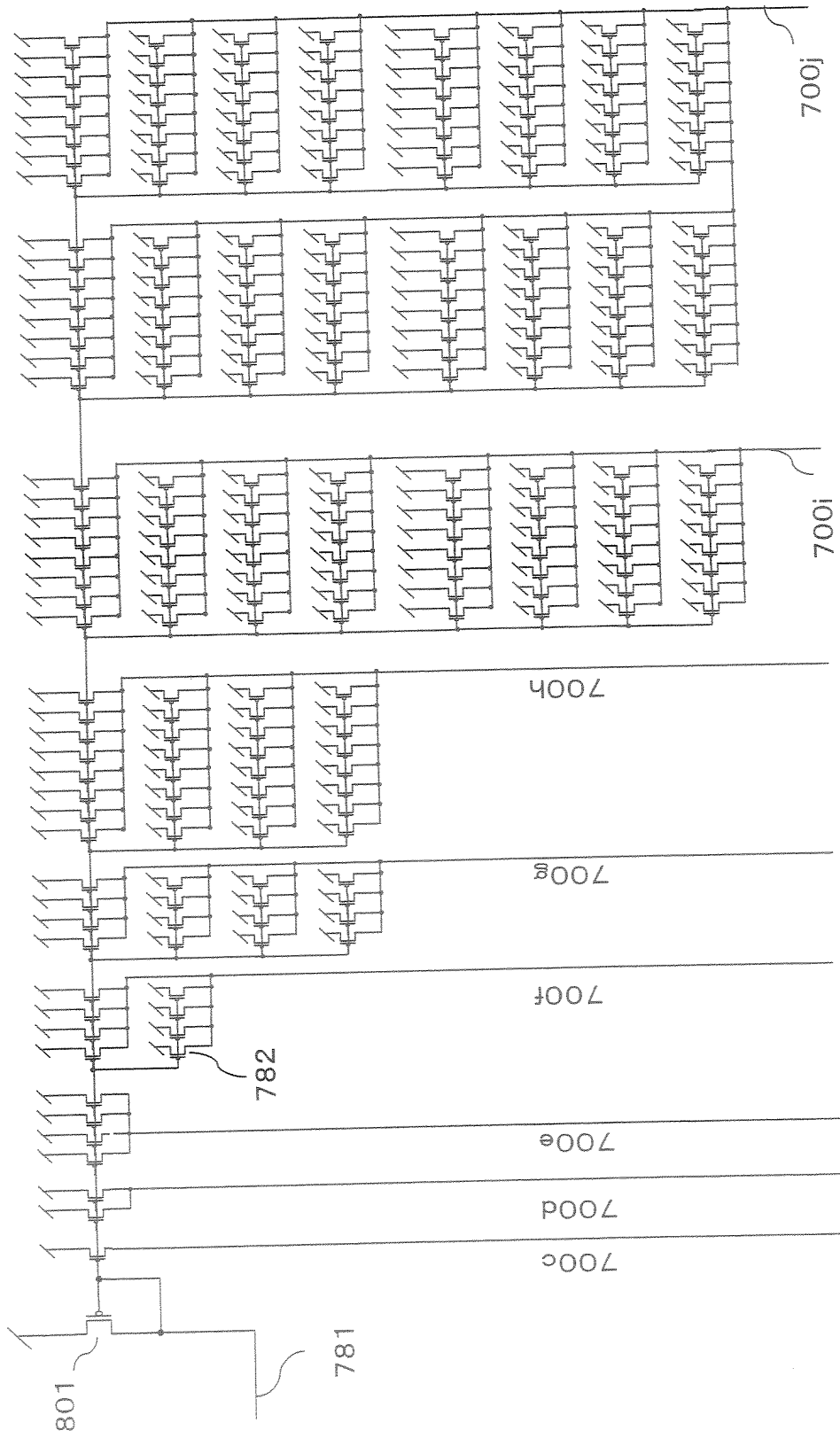


Fig. 81

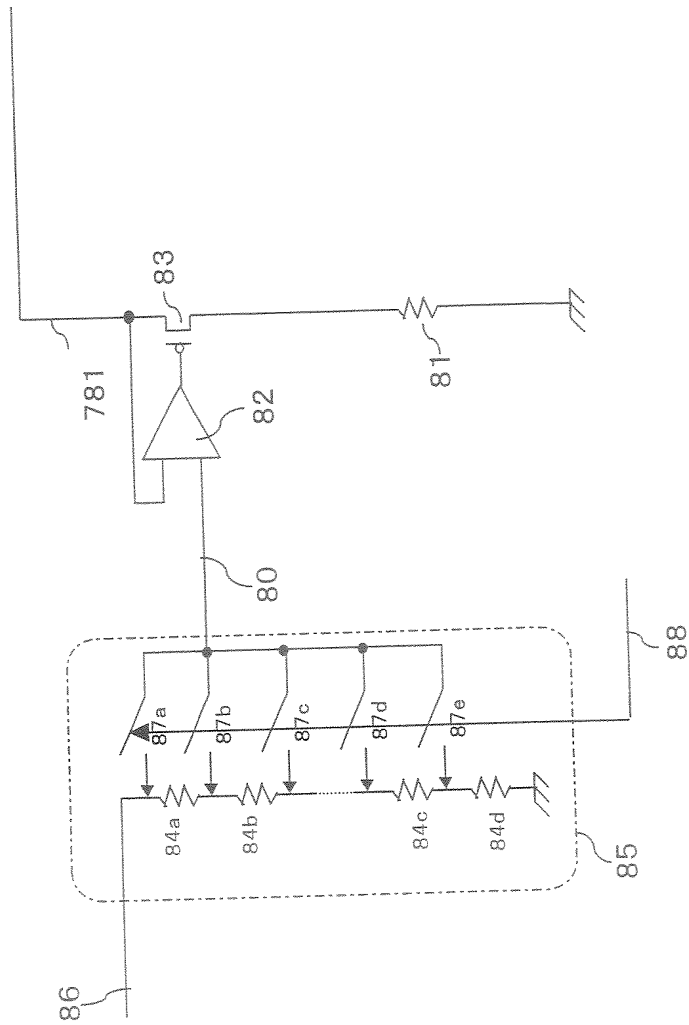


Fig. 82

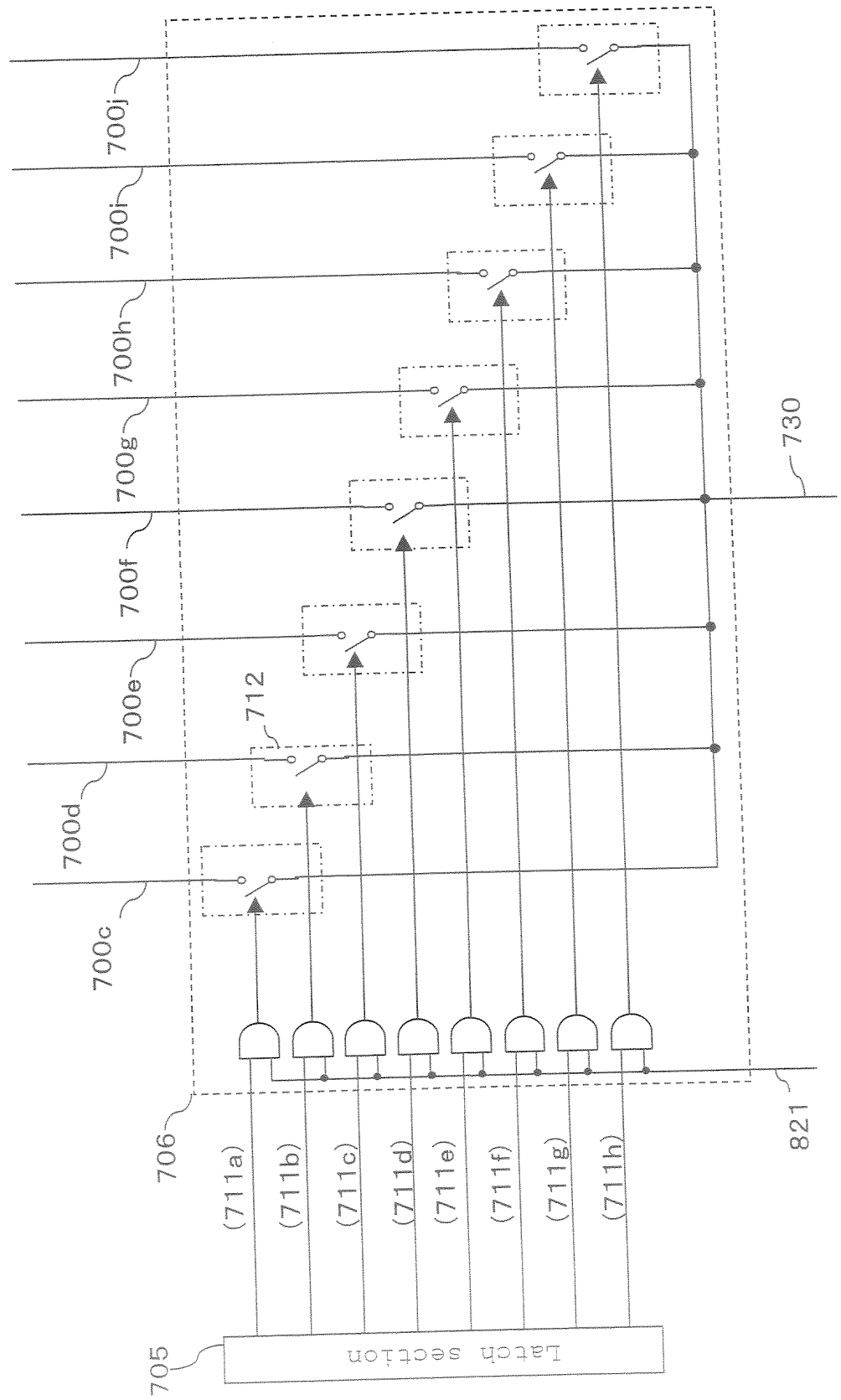
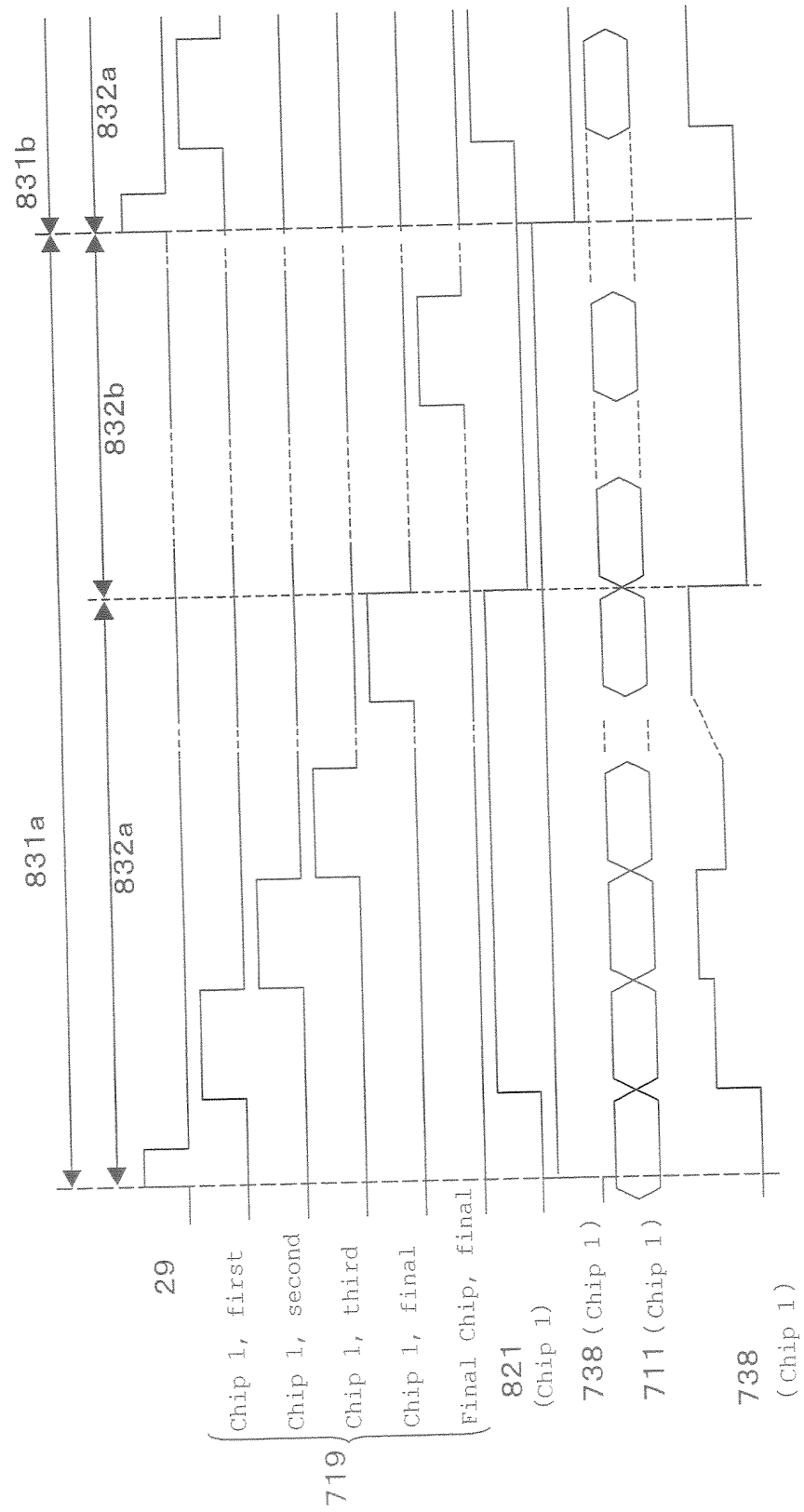


Fig. 83



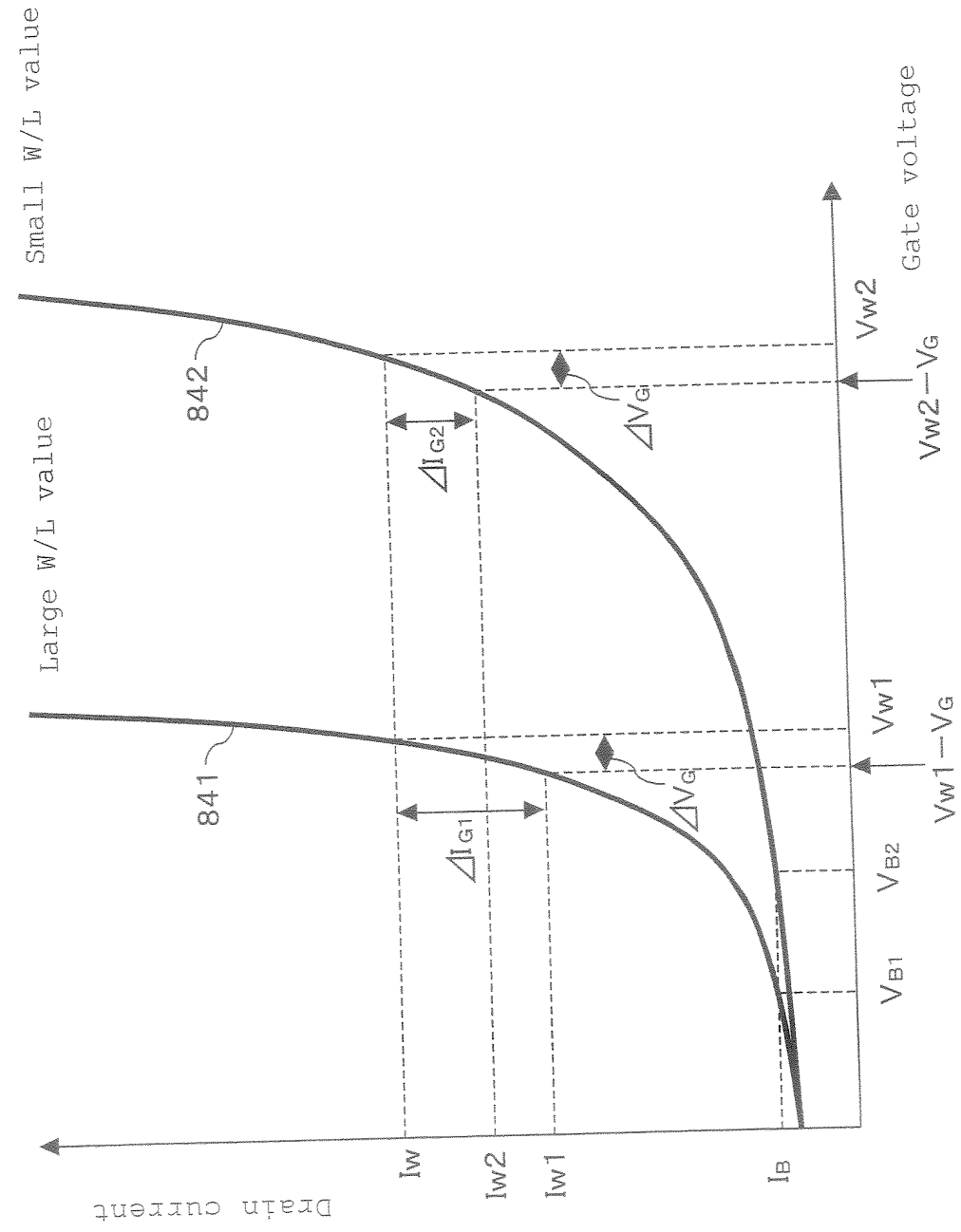


Fig. 84

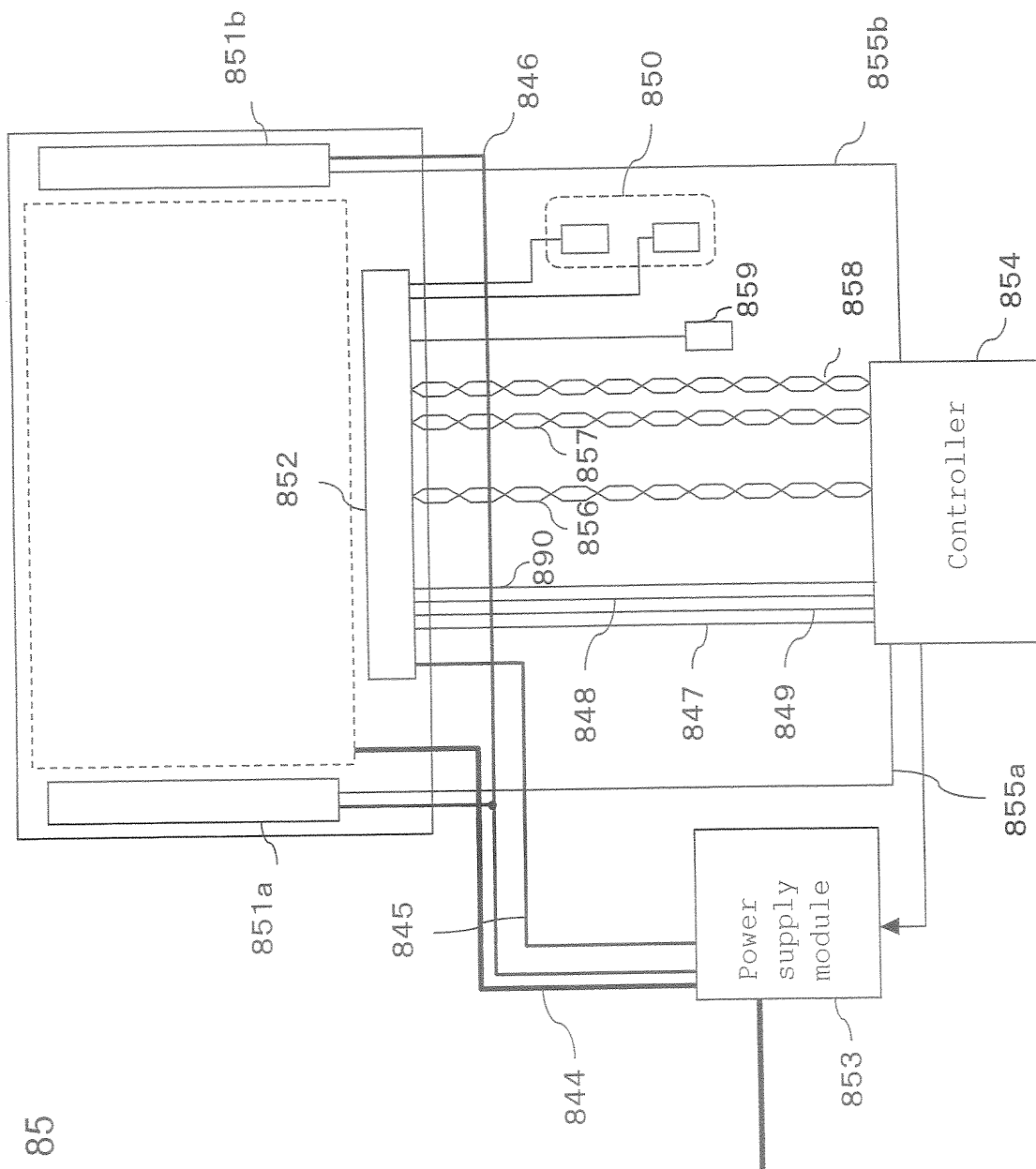


Fig. 85

Fig. 86

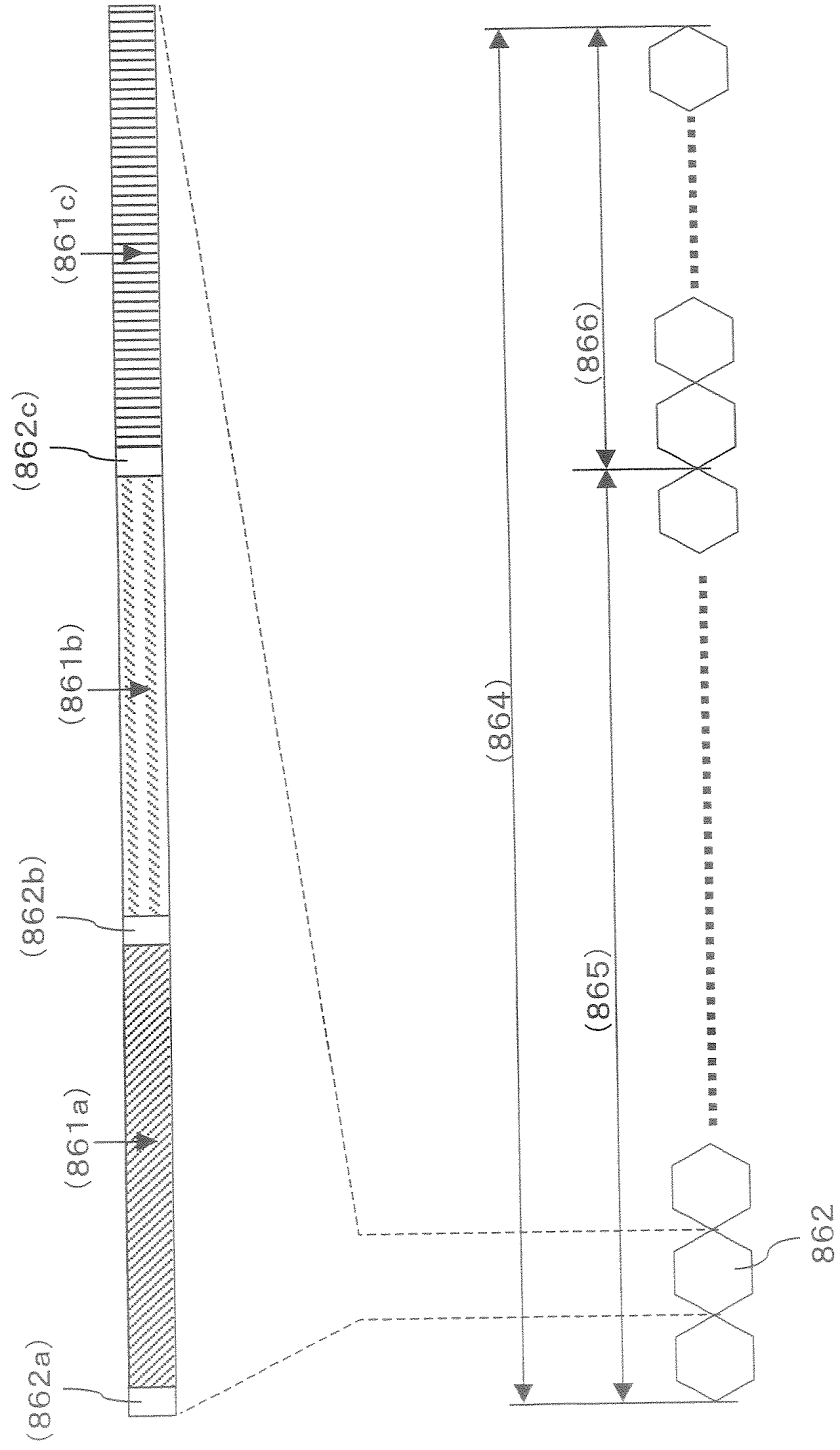


Fig. 87

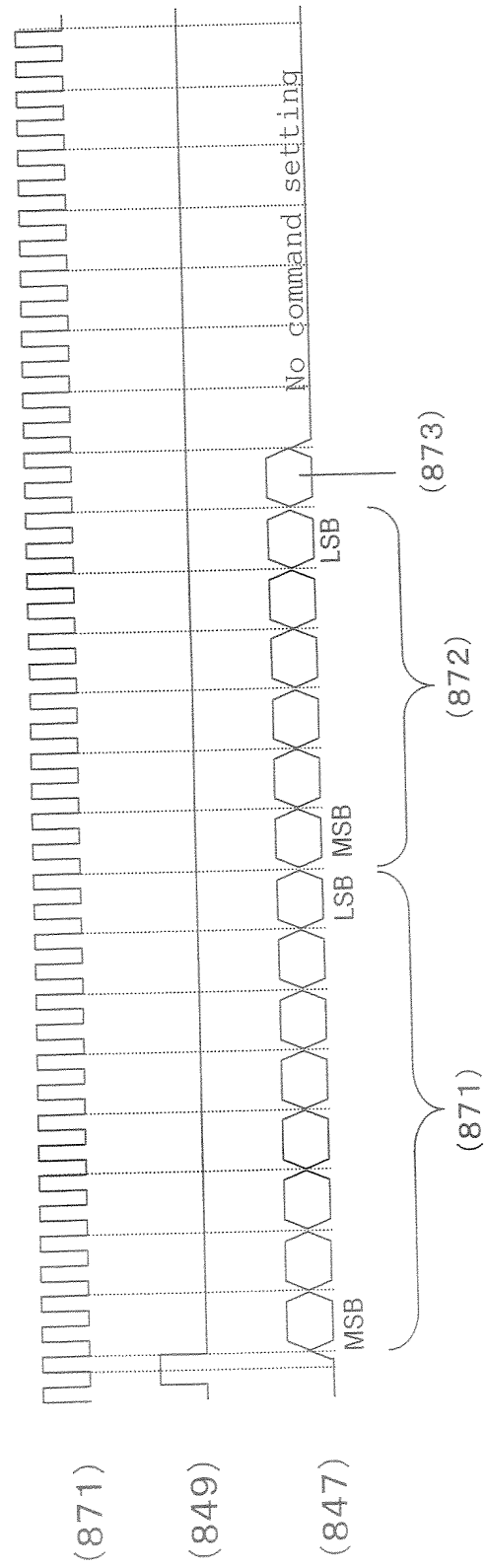


Fig. 88

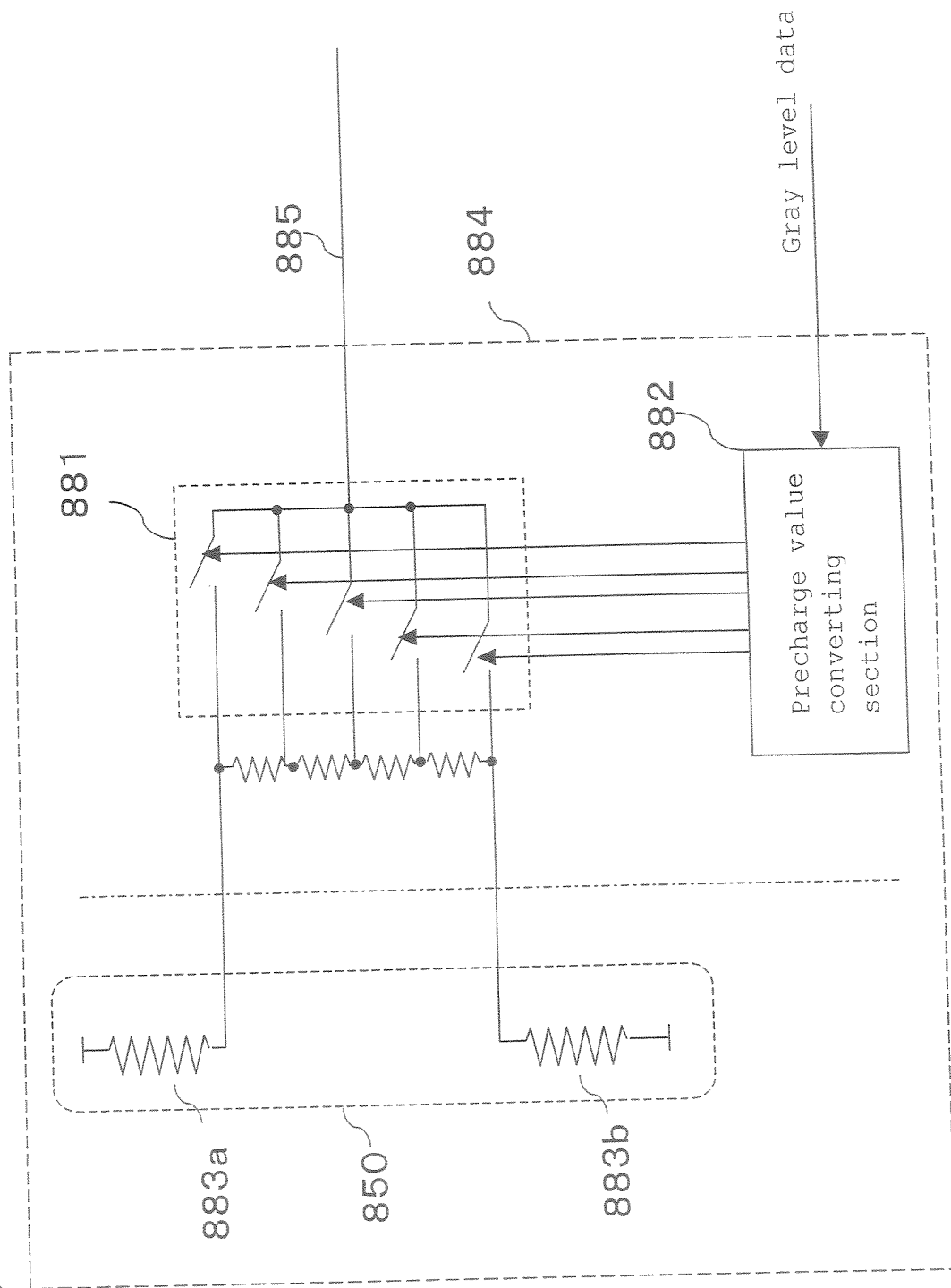


Fig. 89

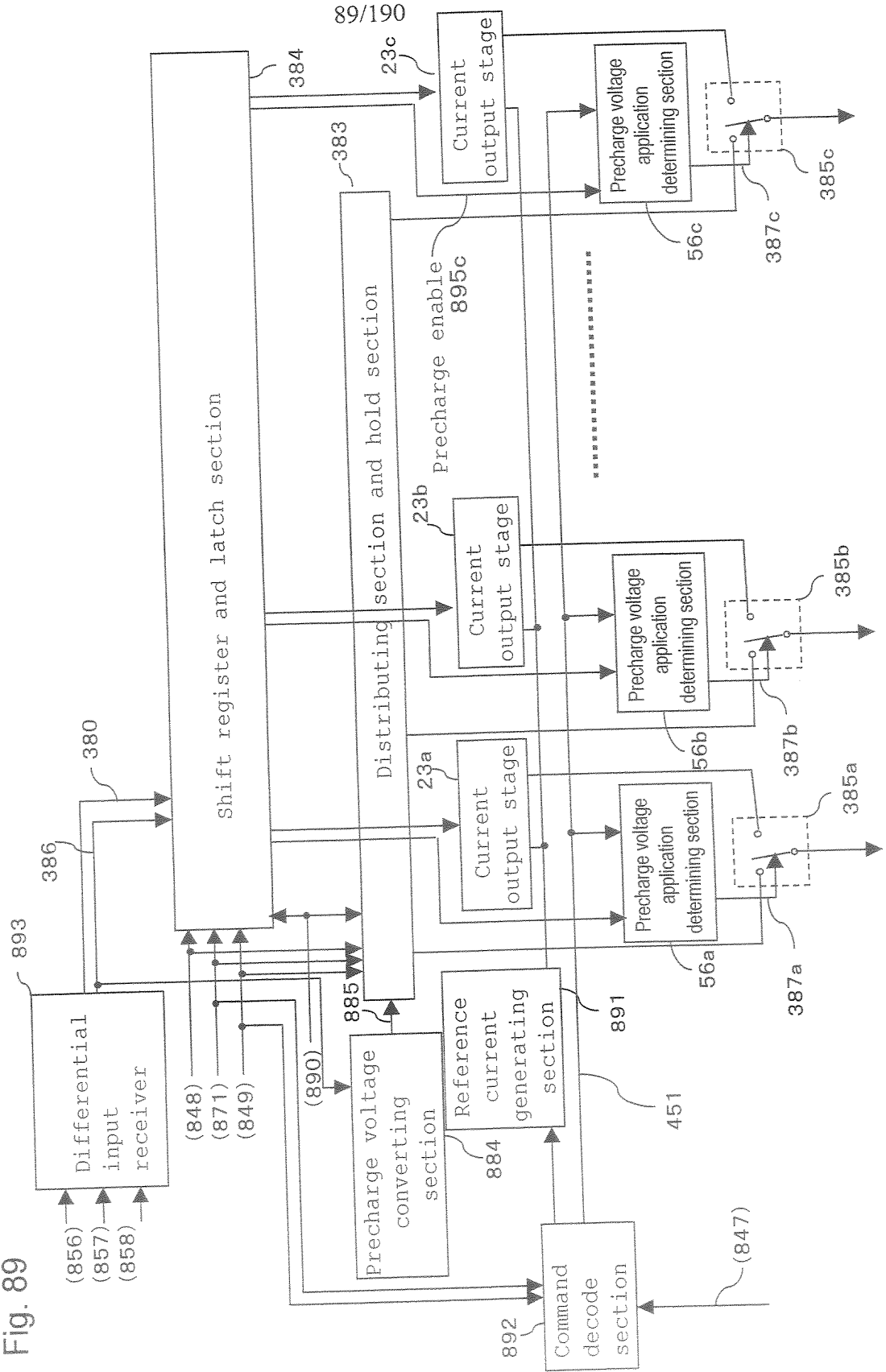


Fig. 90

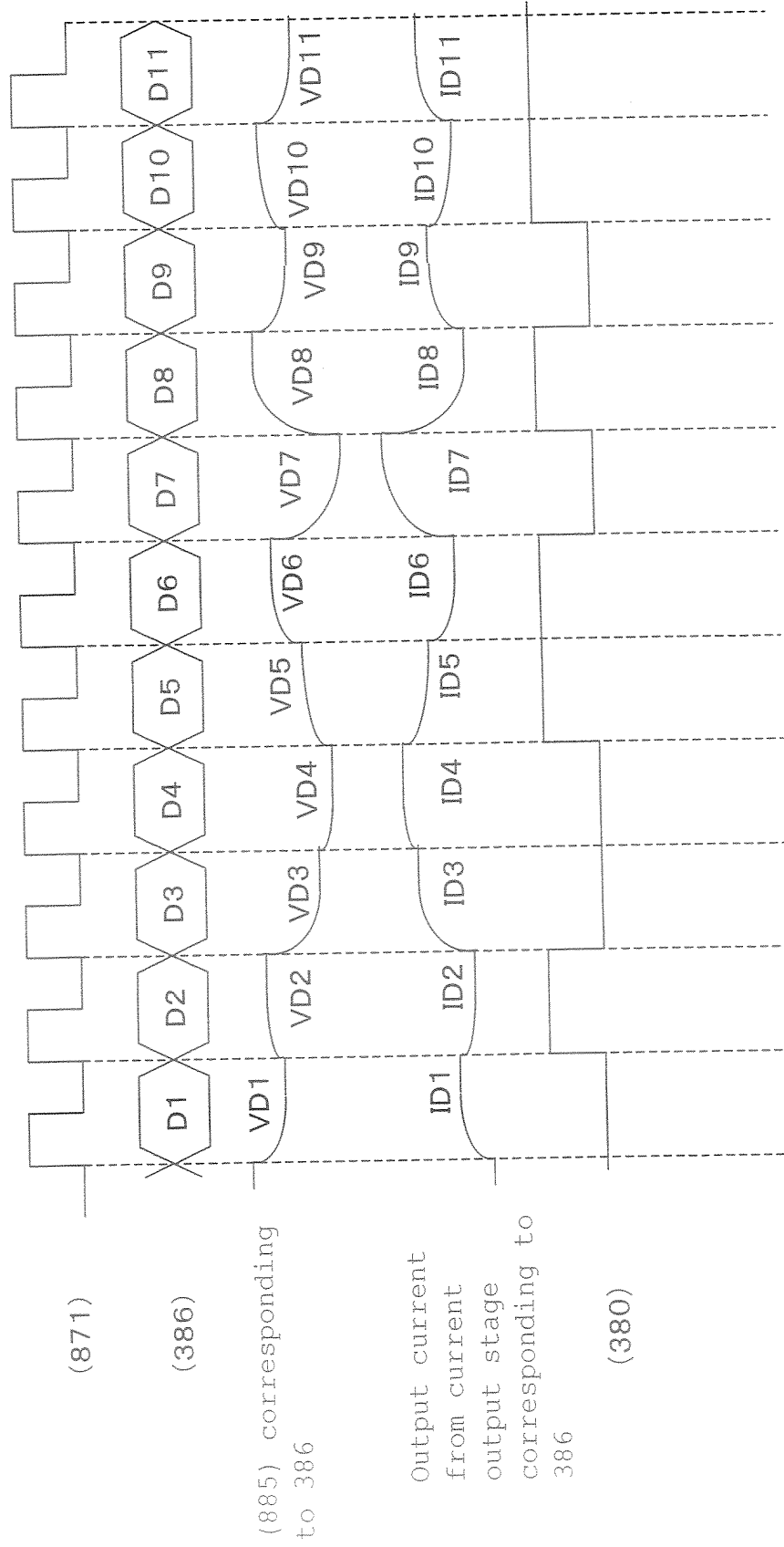


Fig. 91 (a)

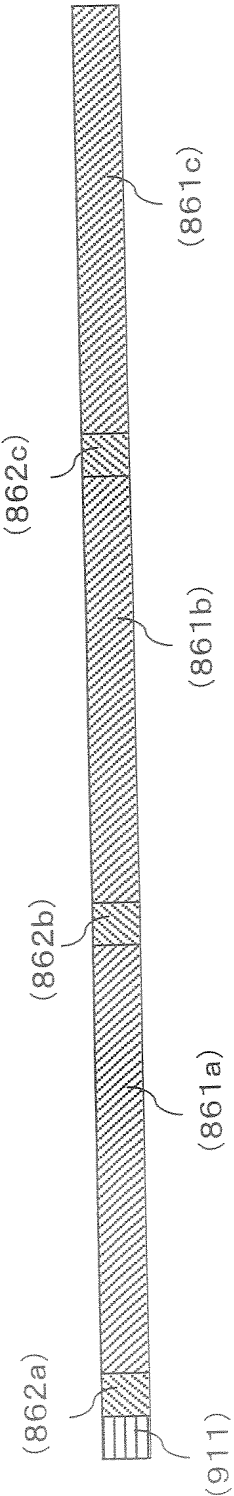


Fig. 91 (b)

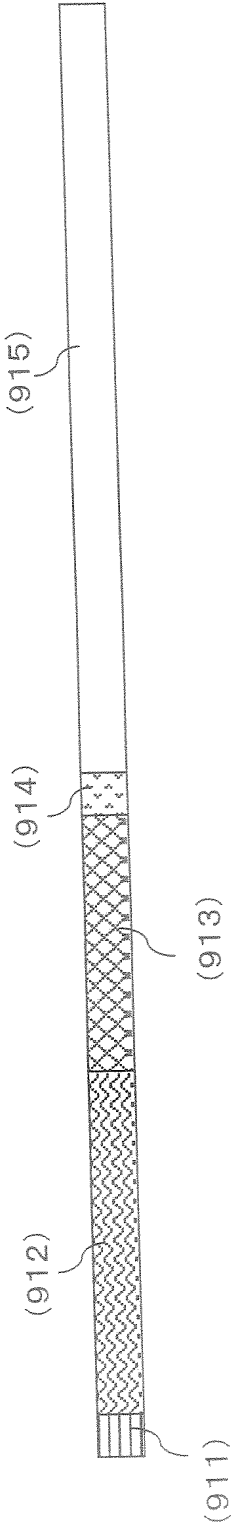


Fig. 92

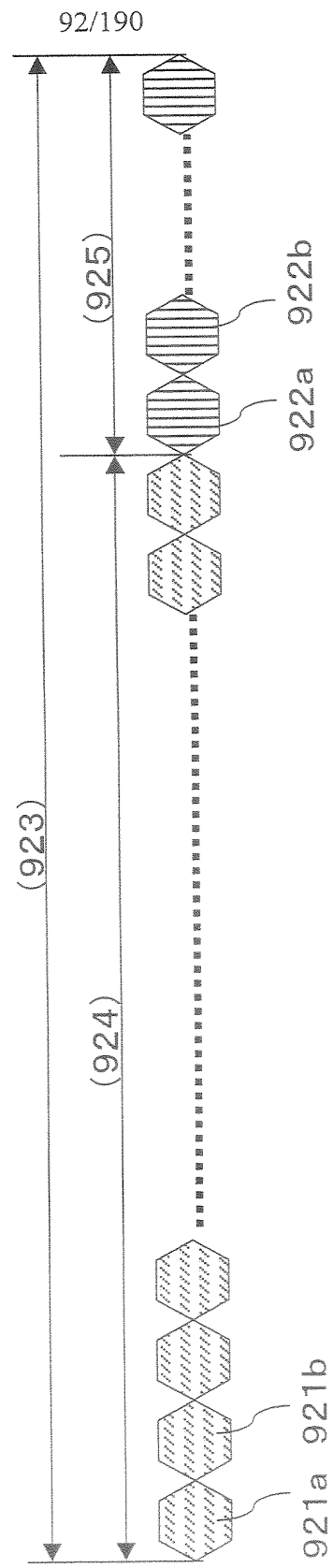
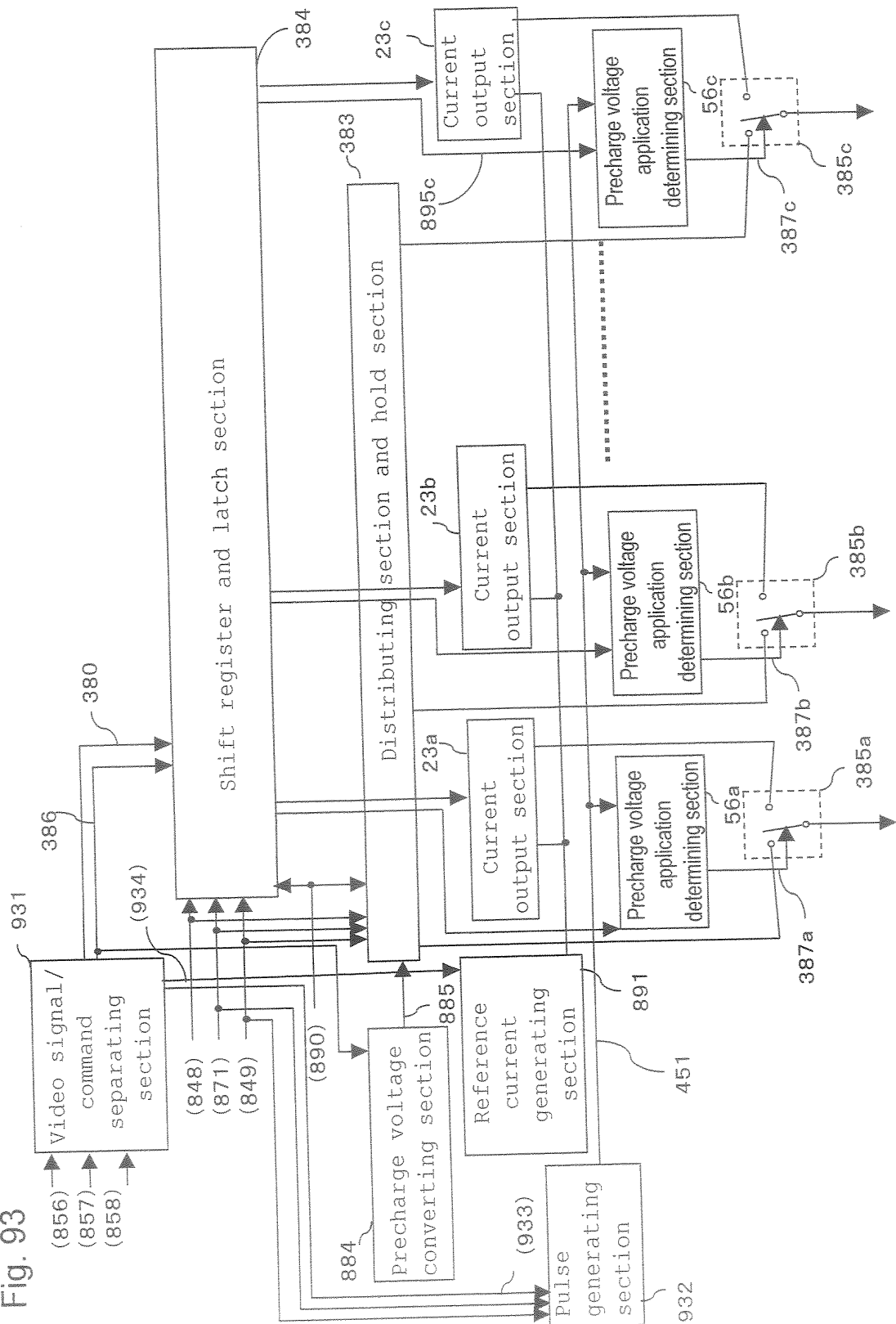


Fig. 93



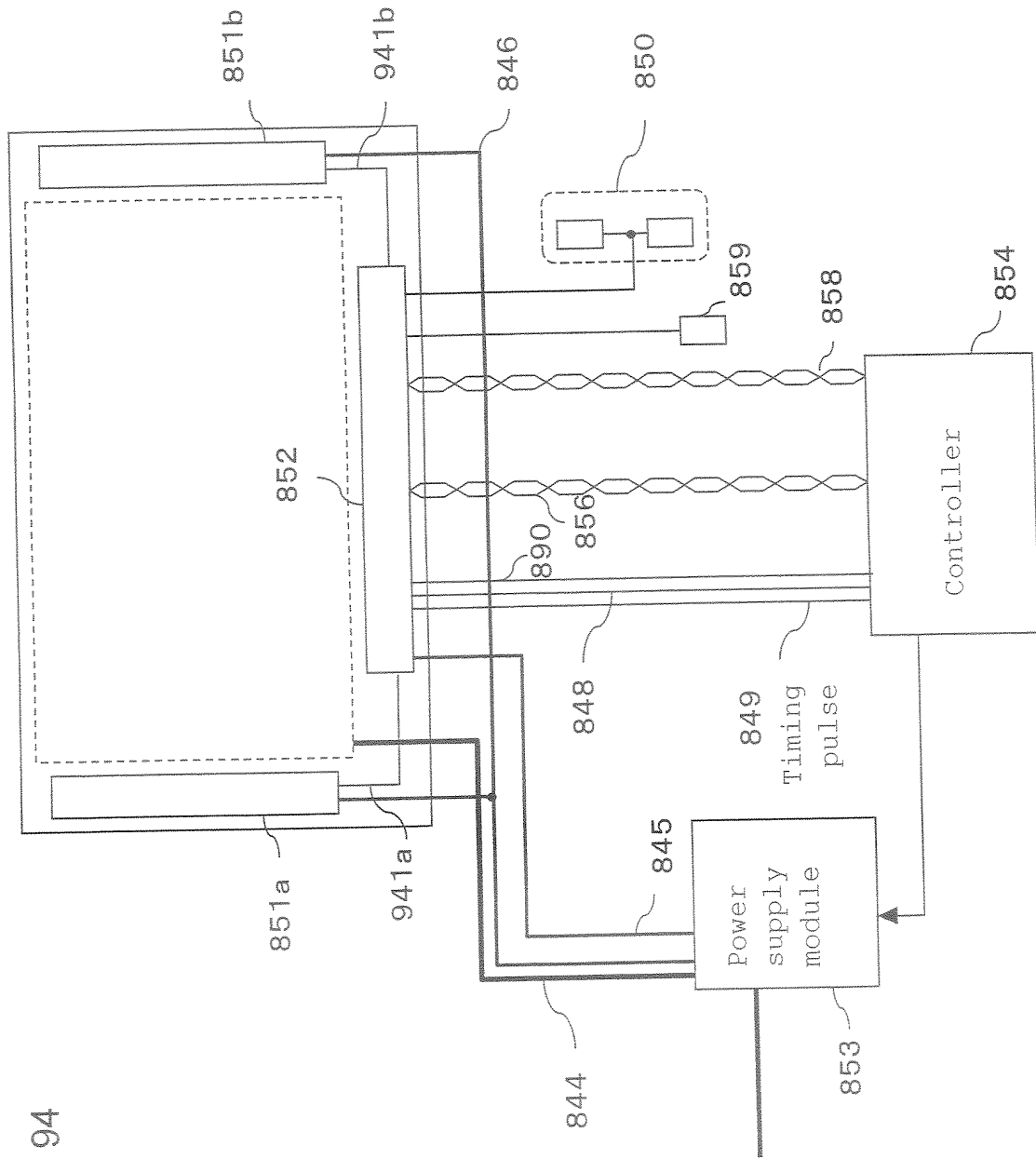


Fig. 94

Fig. 96

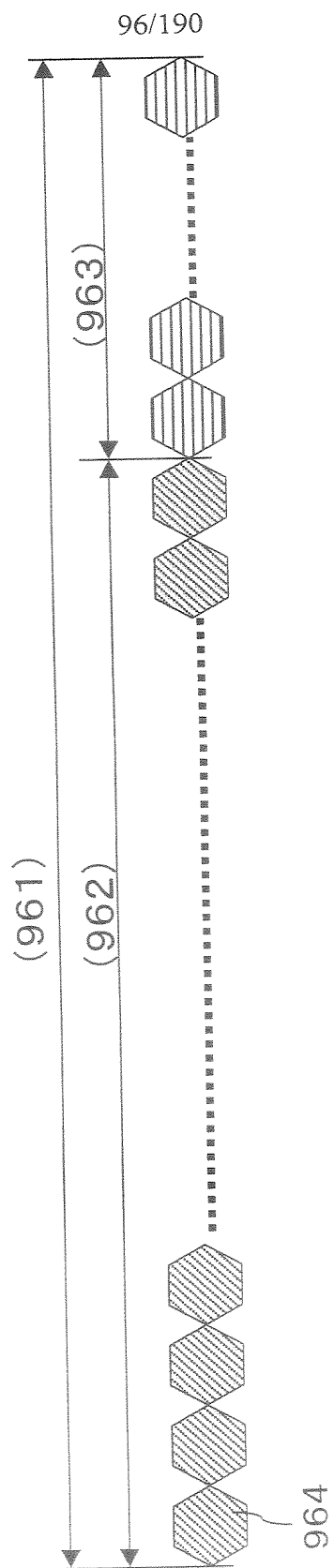
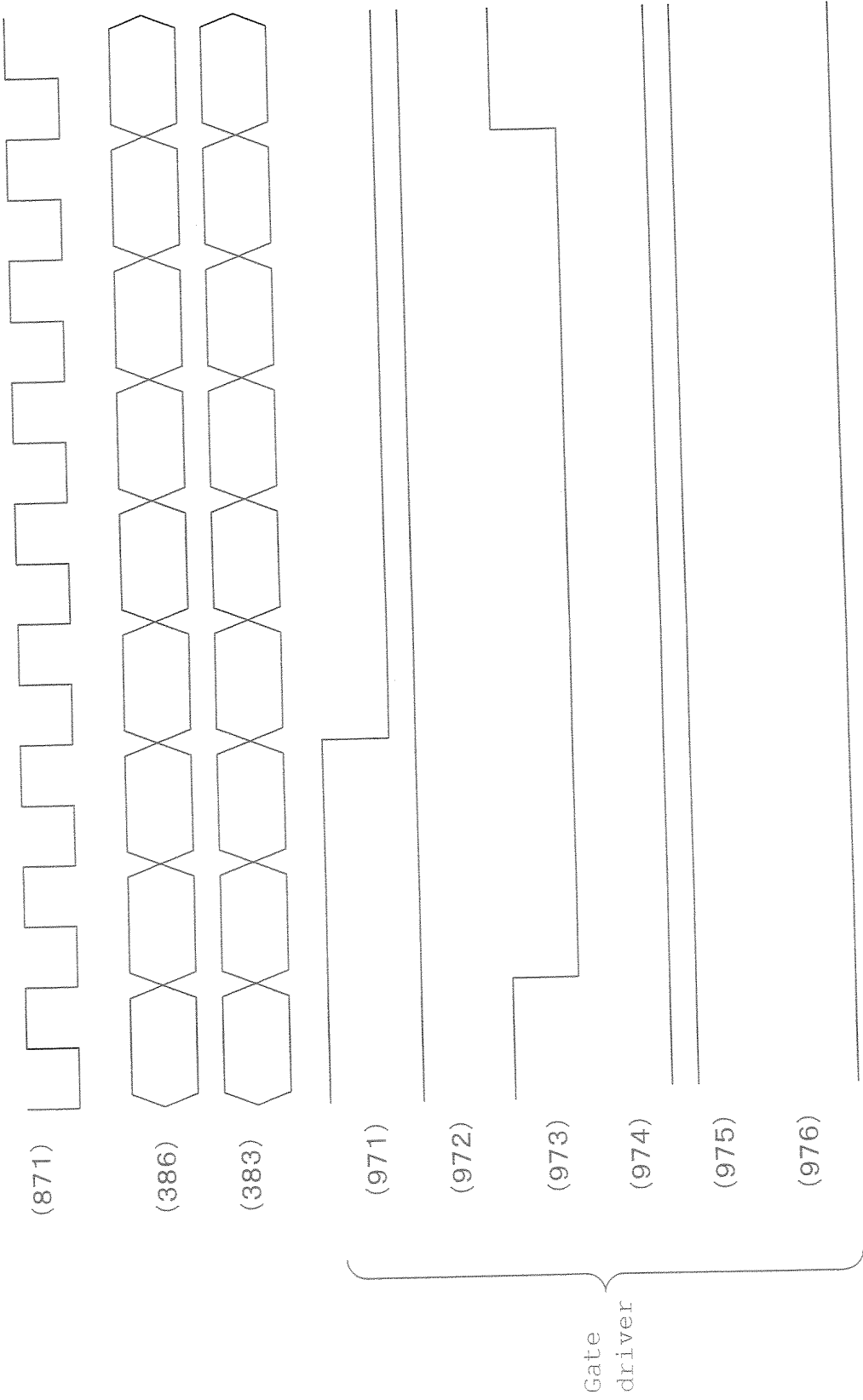


Fig. 97



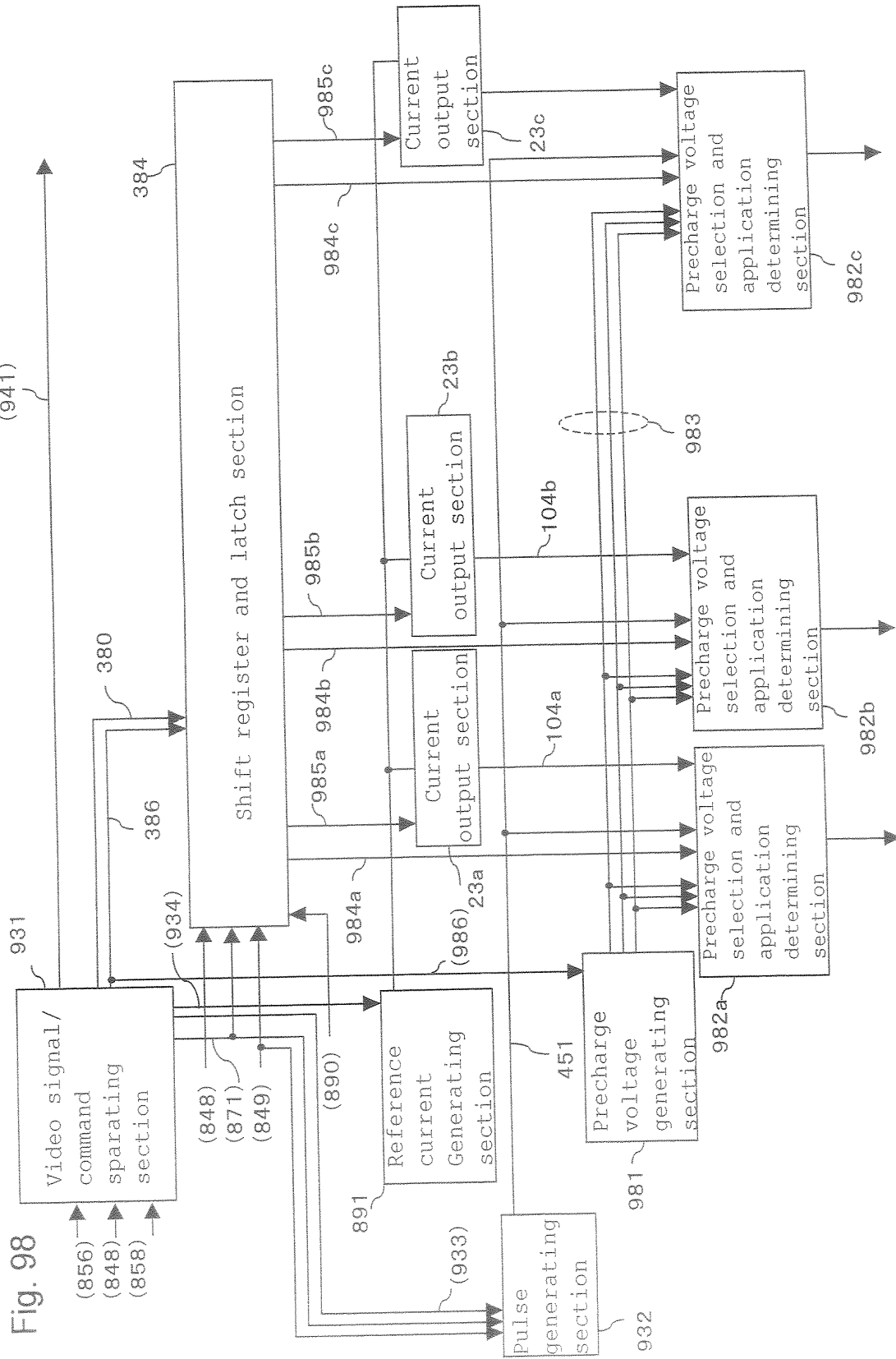


Fig. 99

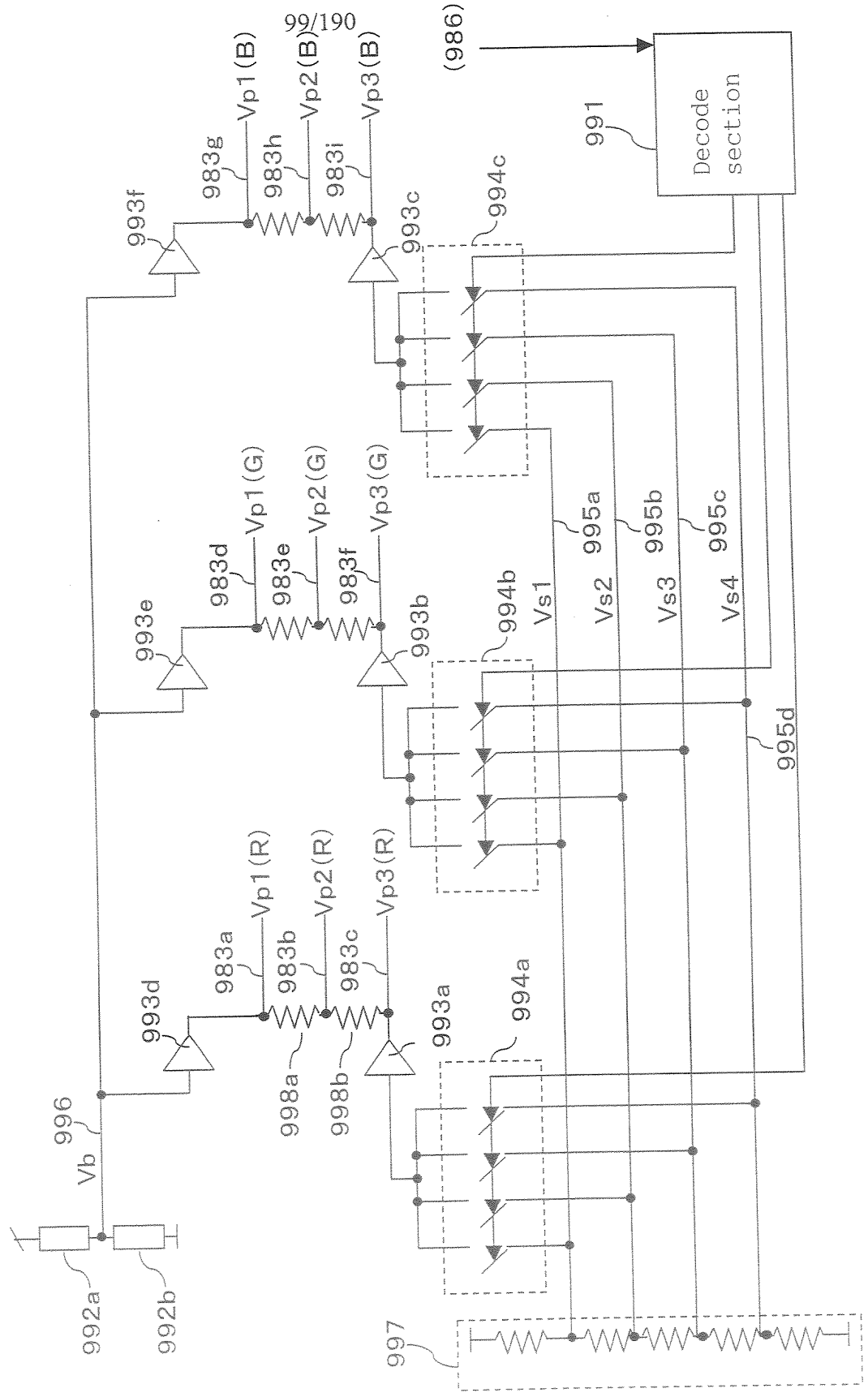


Fig. 100

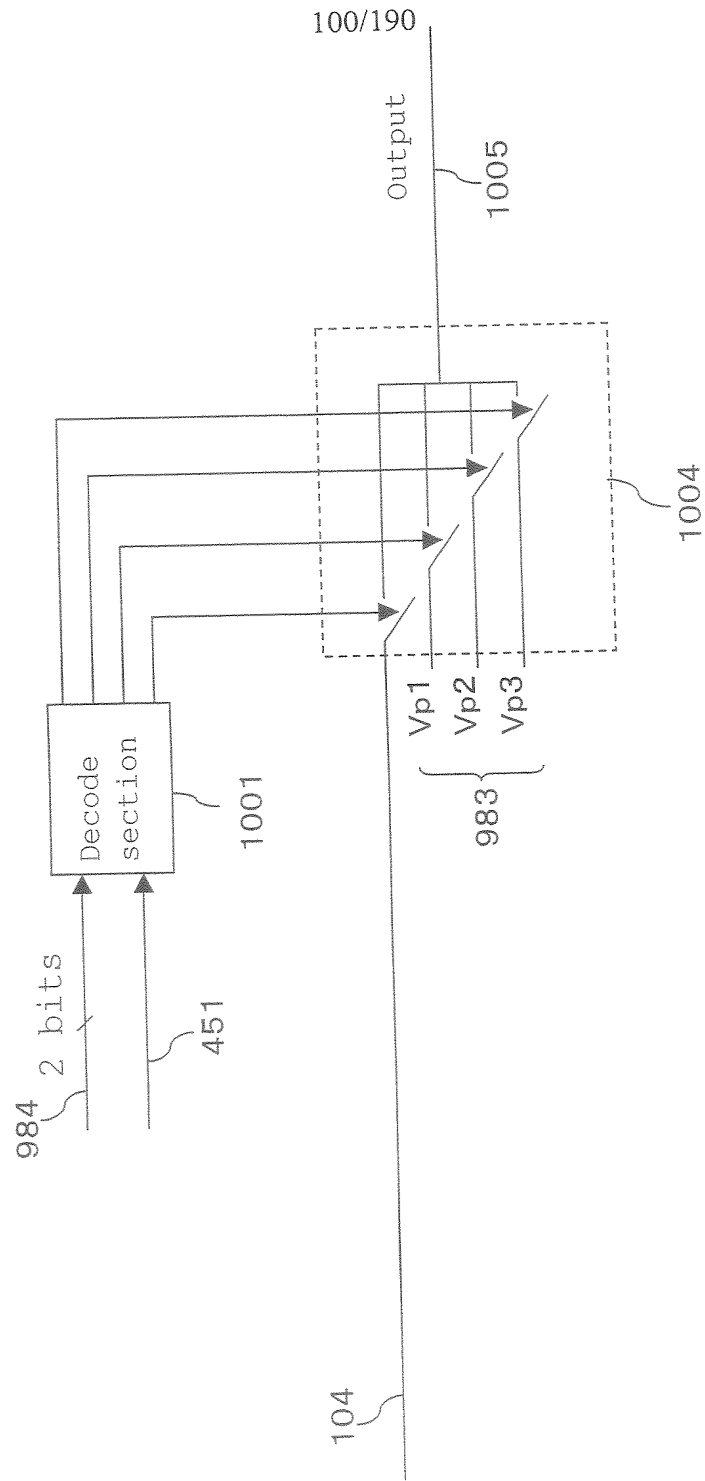


Fig. 101

Precharge pulse(451)	Precharge determination line (984)	Output(1005)
0	0	Gray level current (104)
1	0	Gray level current (104)
0	1	Gray level current (104)
1	1	Vp1
0	2	Gray level current (104)
1	2	Vp2
0	3	Gray level current (104)
1	3	Vp3

Fig. 102

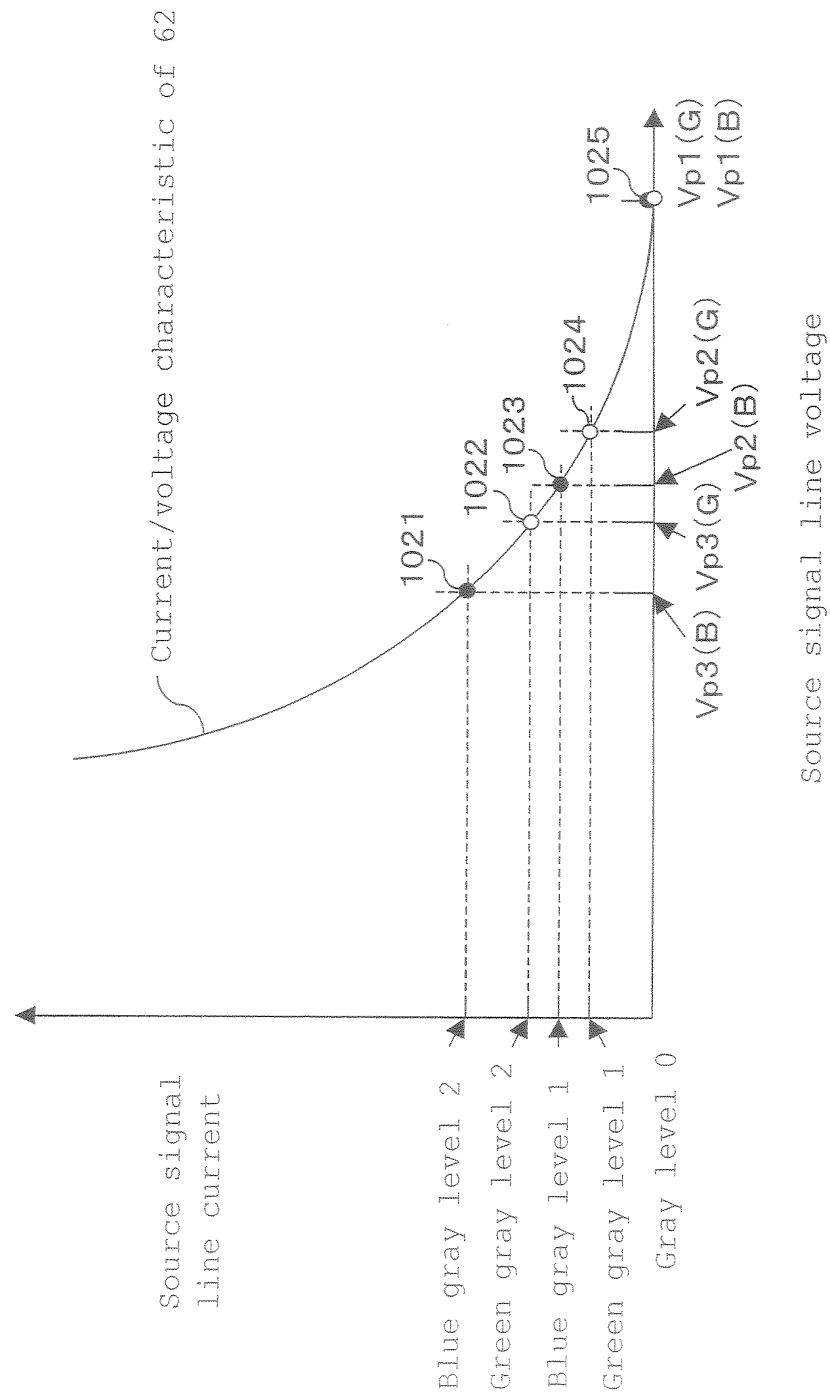


Fig. 103

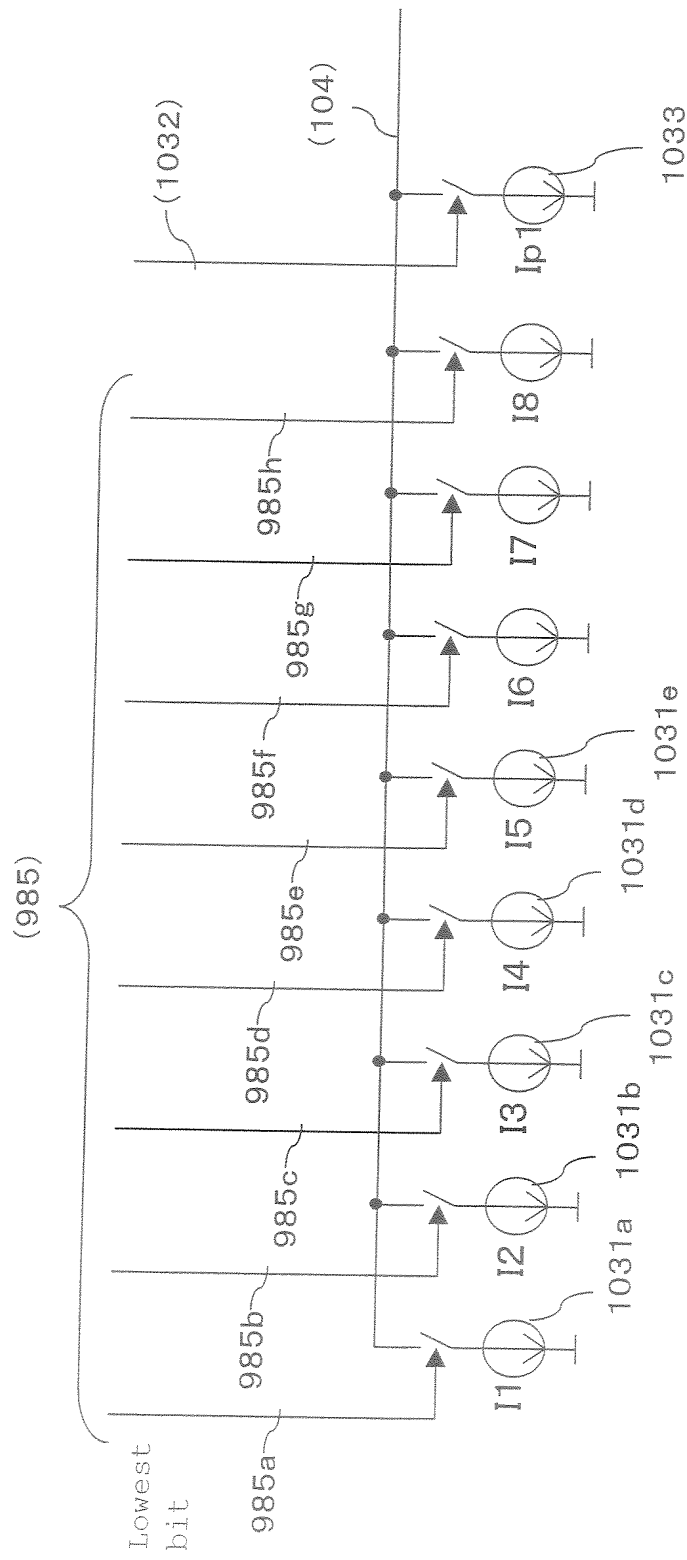
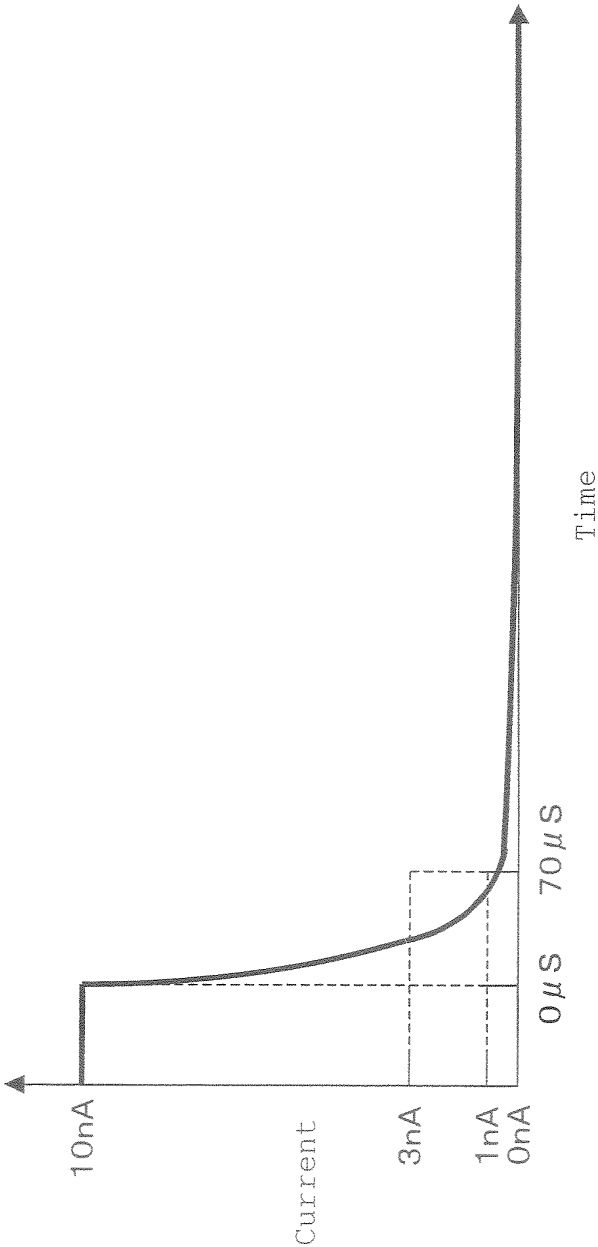


Fig. 104



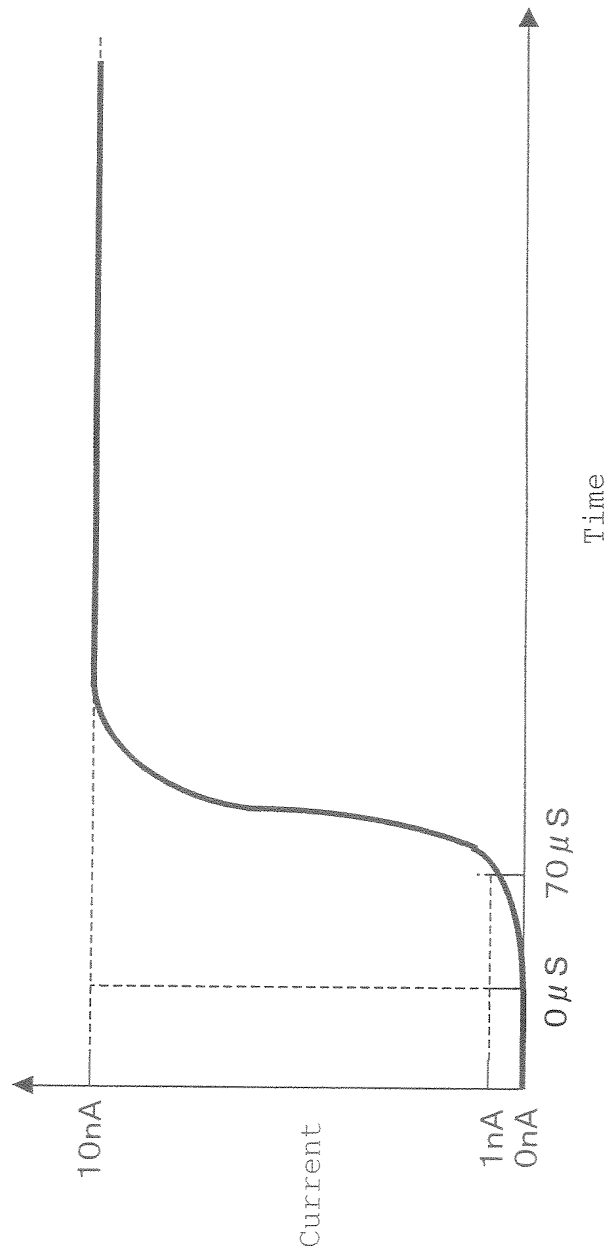


Fig. 105

Fig. 106

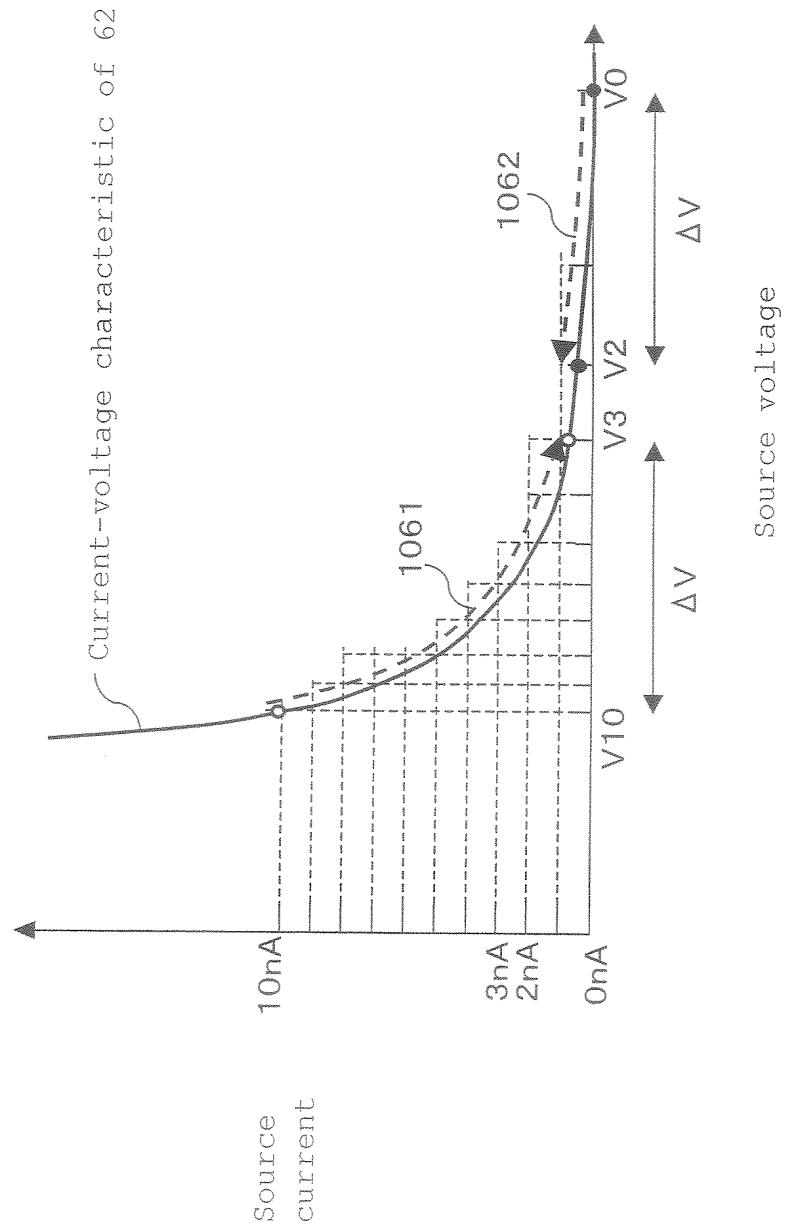
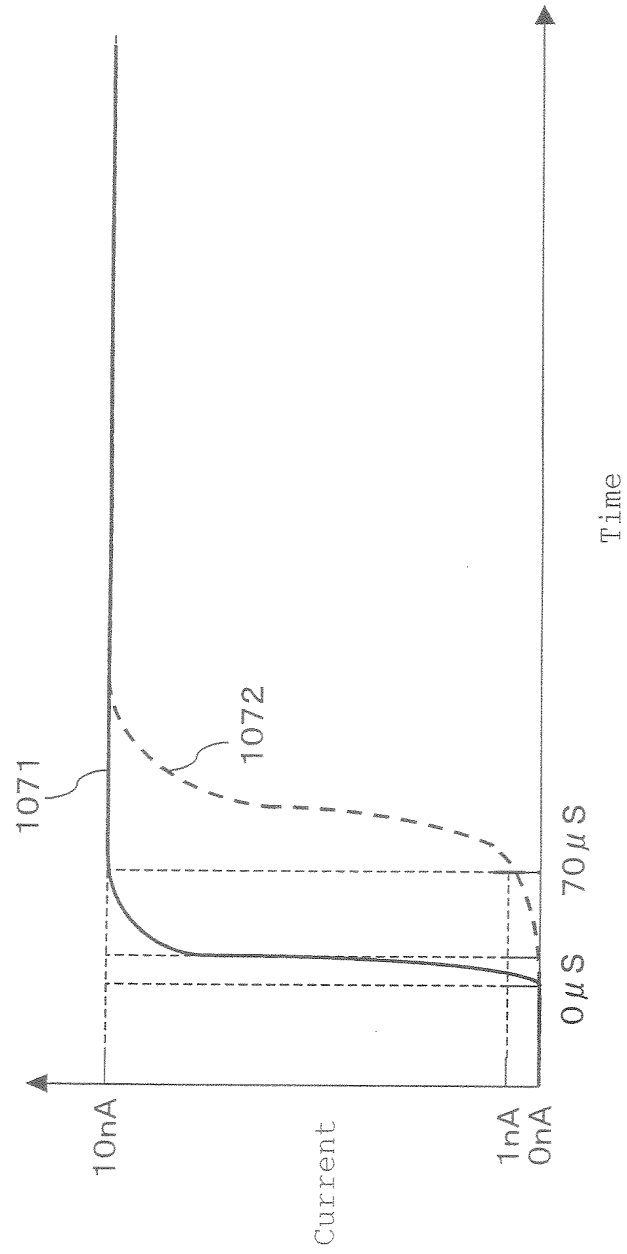


Fig. 107



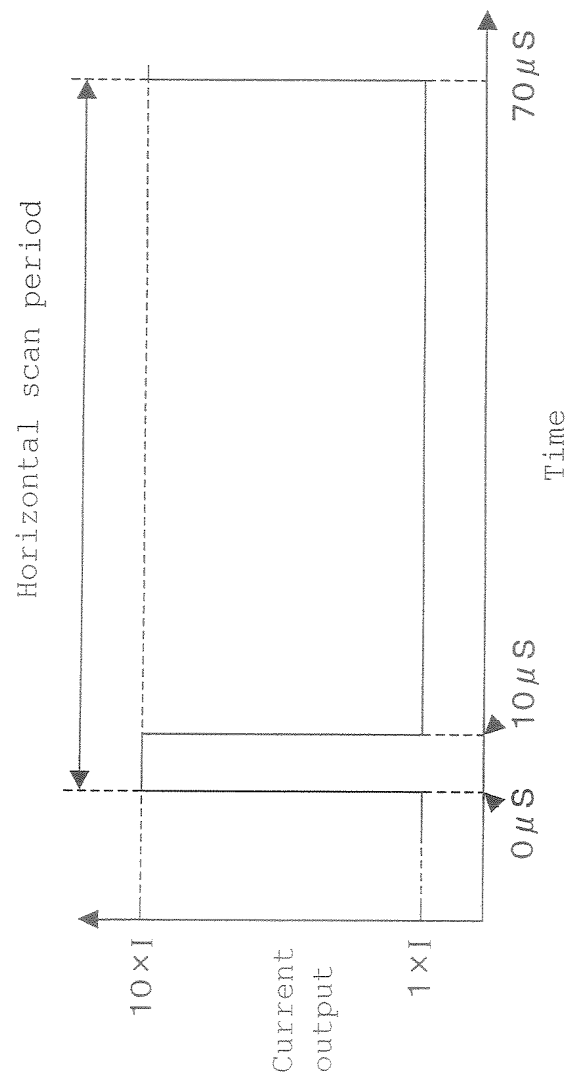


Fig. 108

Fig. 109

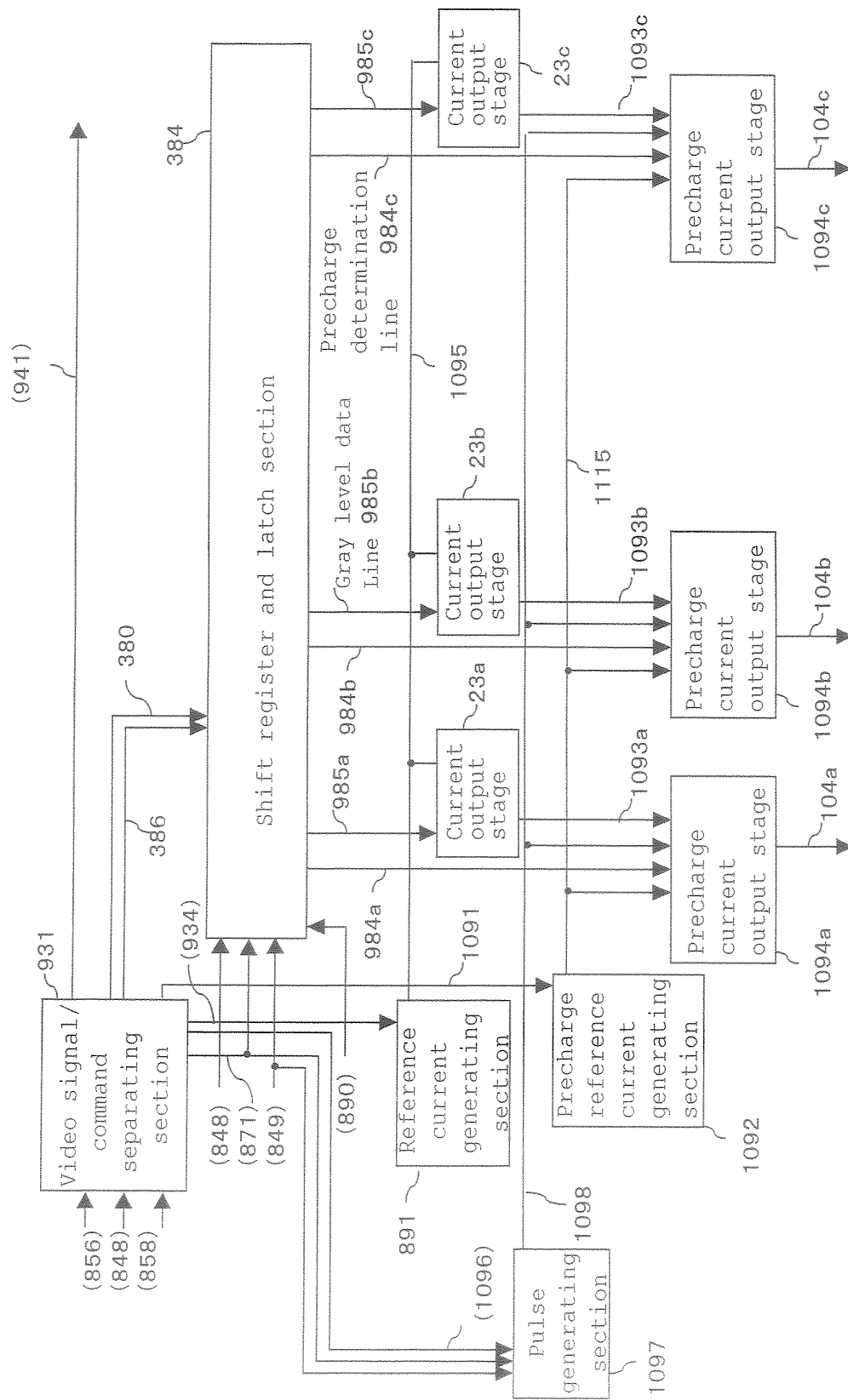
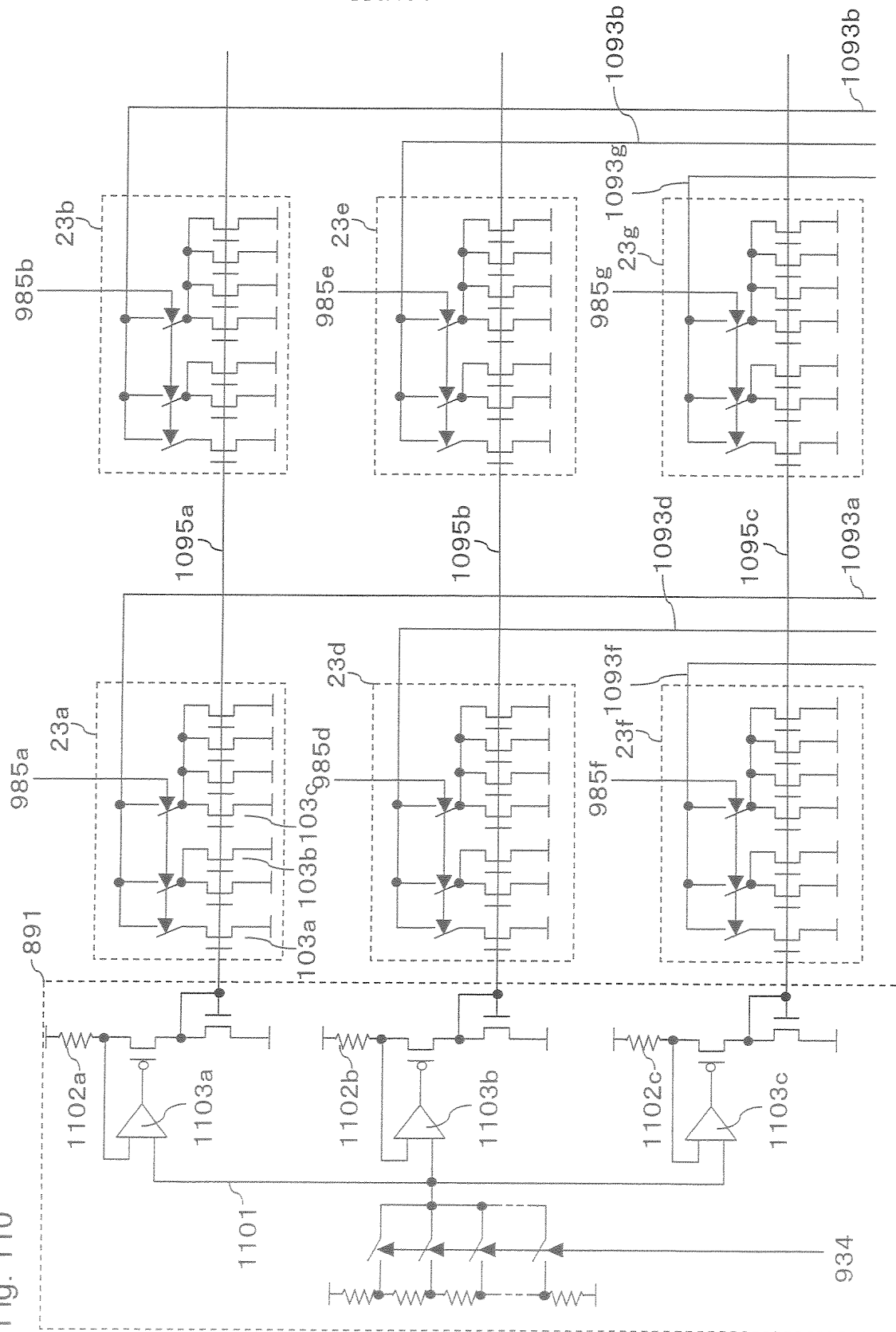


Fig. 110



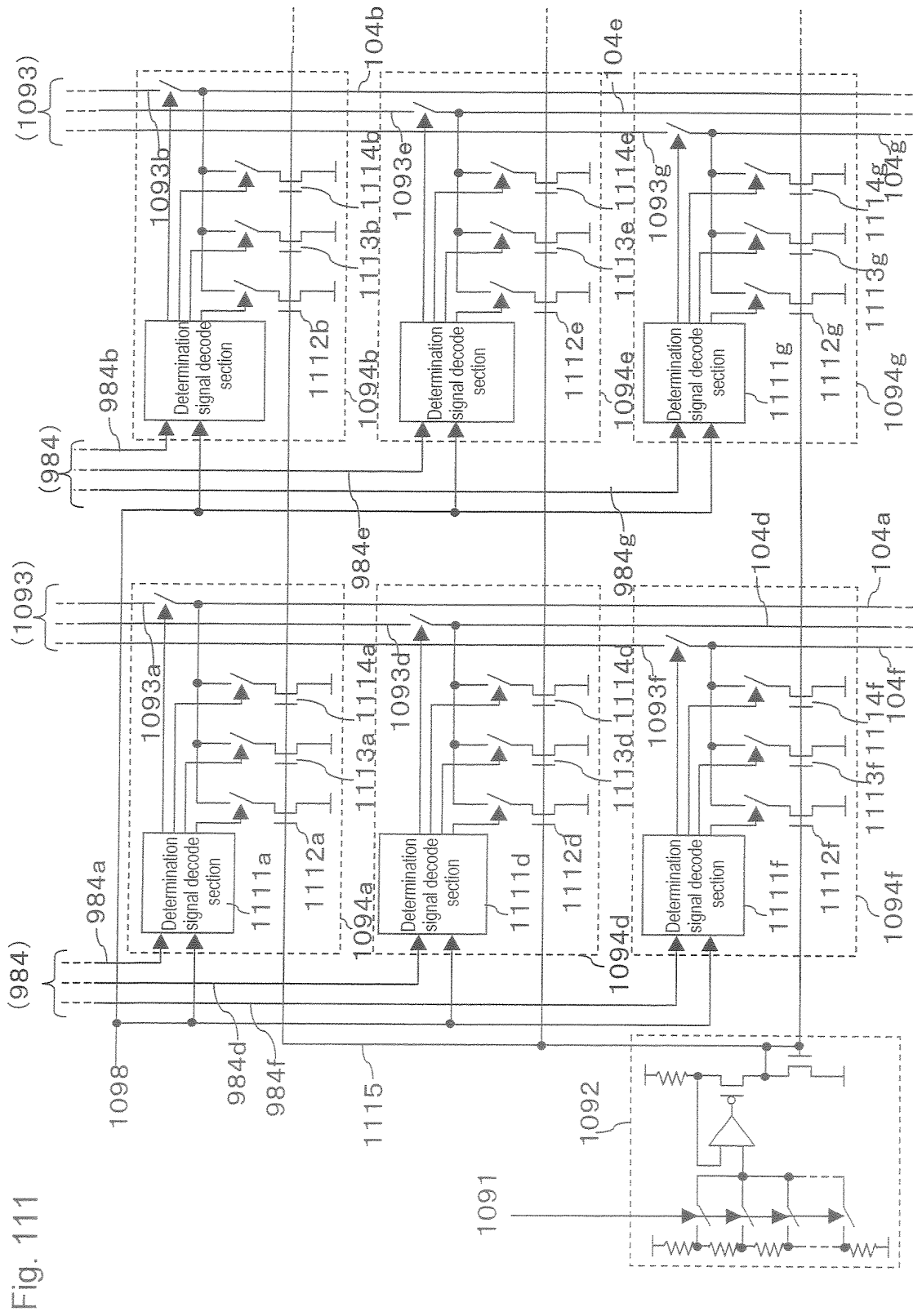


Fig. 114

984		451	1098	1132	1133	1134	1135	State
Upper bit	Lower bit							
0	0	X	X	OFF	OFF	ON	OFF	No precharge for current or voltage
0	1	0	X	OFF	OFF	ON	OFF	Voltage precharge
		1	X	OFF	OFF	OFF	ON	
1	0	X	0	OFF	OFF	ON	OFF	Current precharge (current source 1112)
		X	1	ON	OFF	OFF	OFF	
1	1	X	0	OFF	OFF	ON	OFF	Current precharge (current source 1113)
		X	1	OFF	ON	OFF	OFF	

X indicates Don't care

Fig. 115

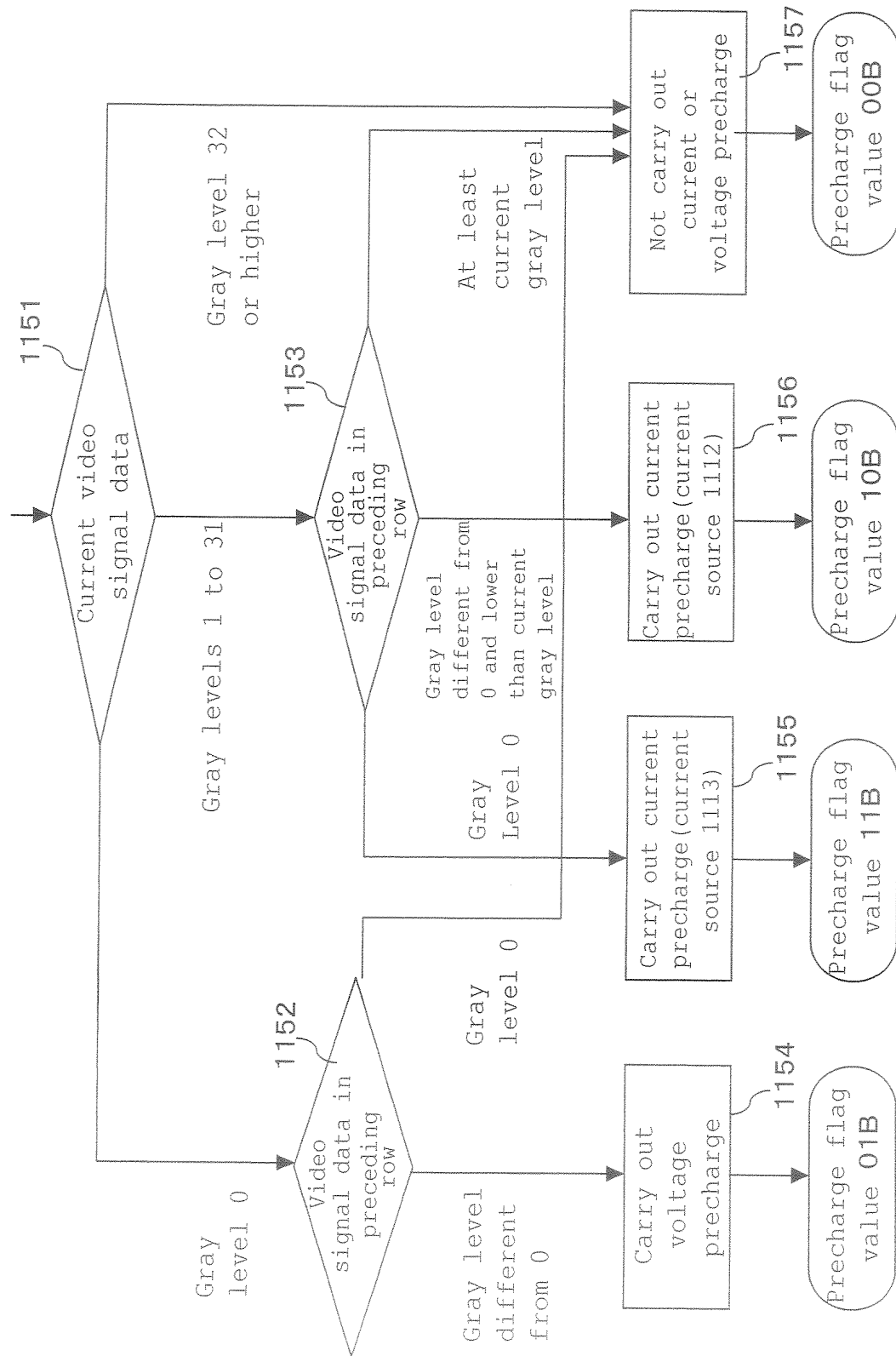


Fig. 116

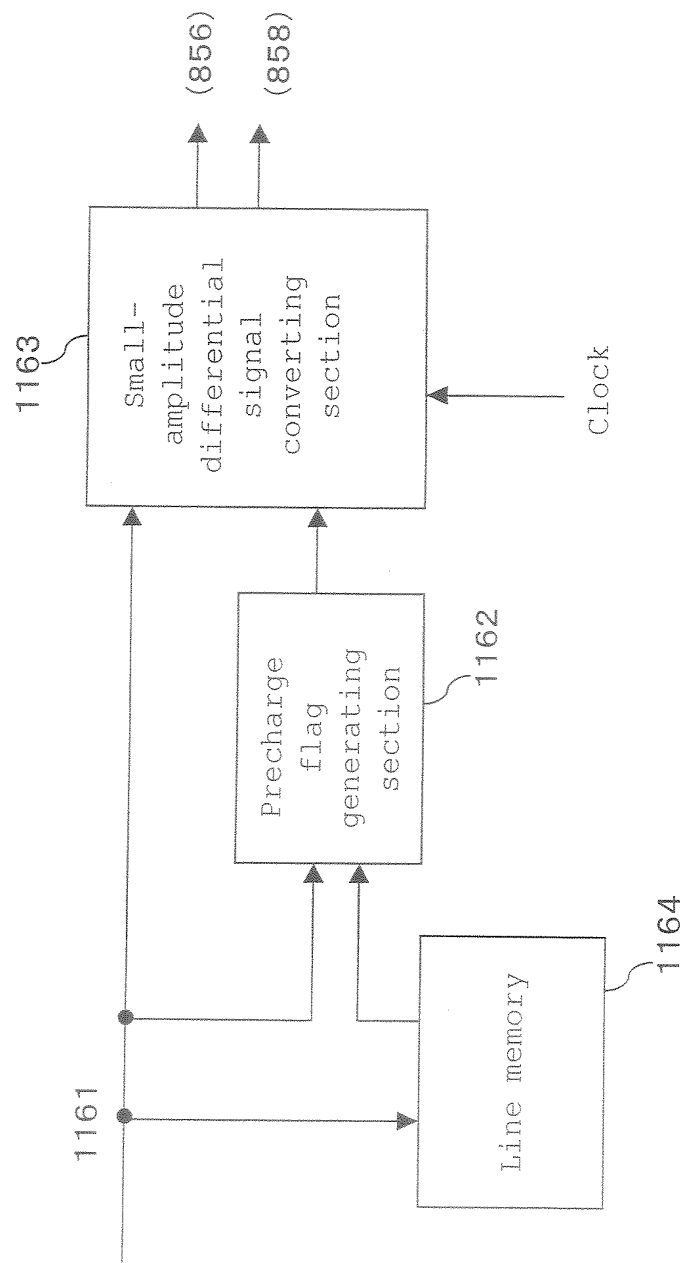


Fig. 117

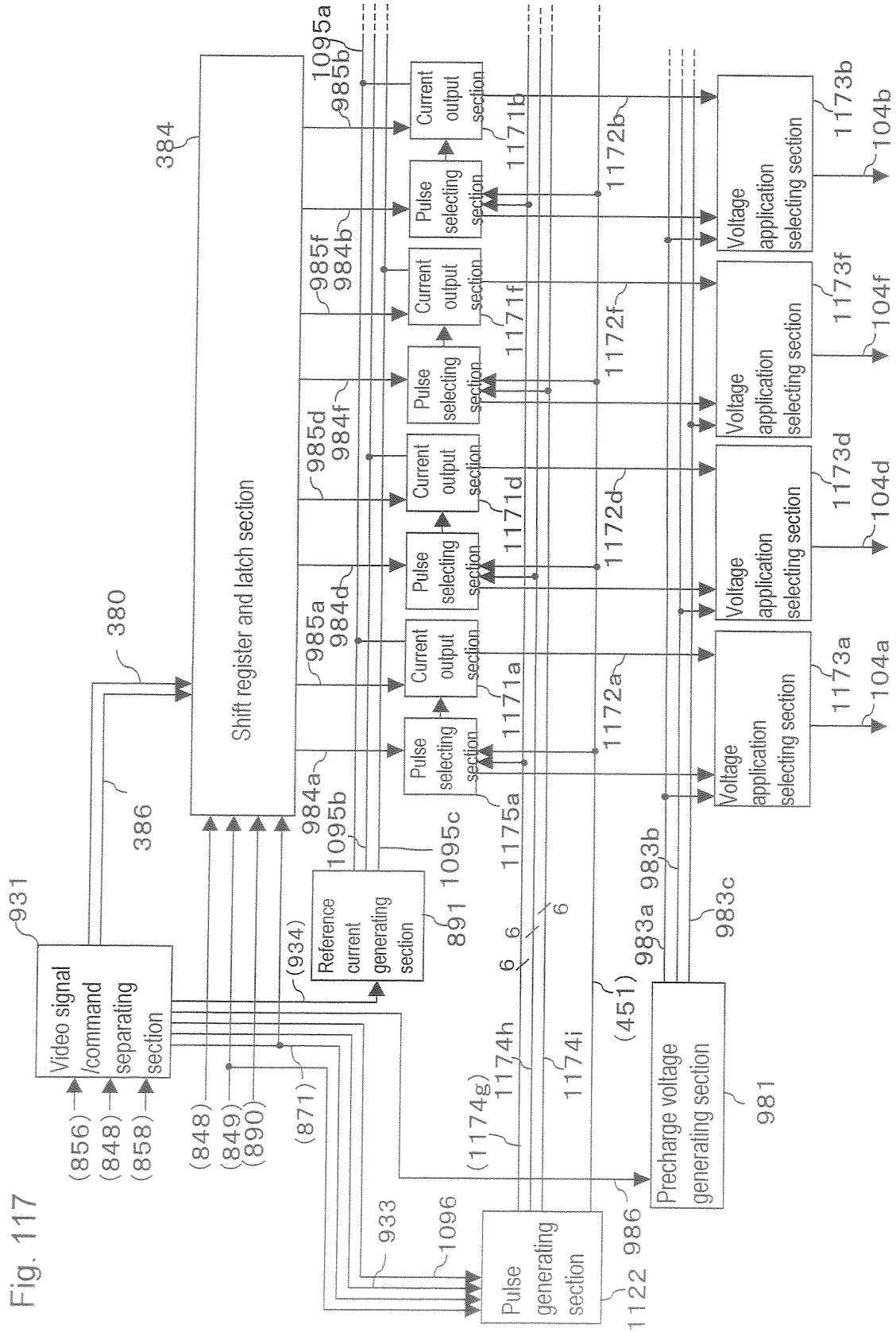


Fig. 118

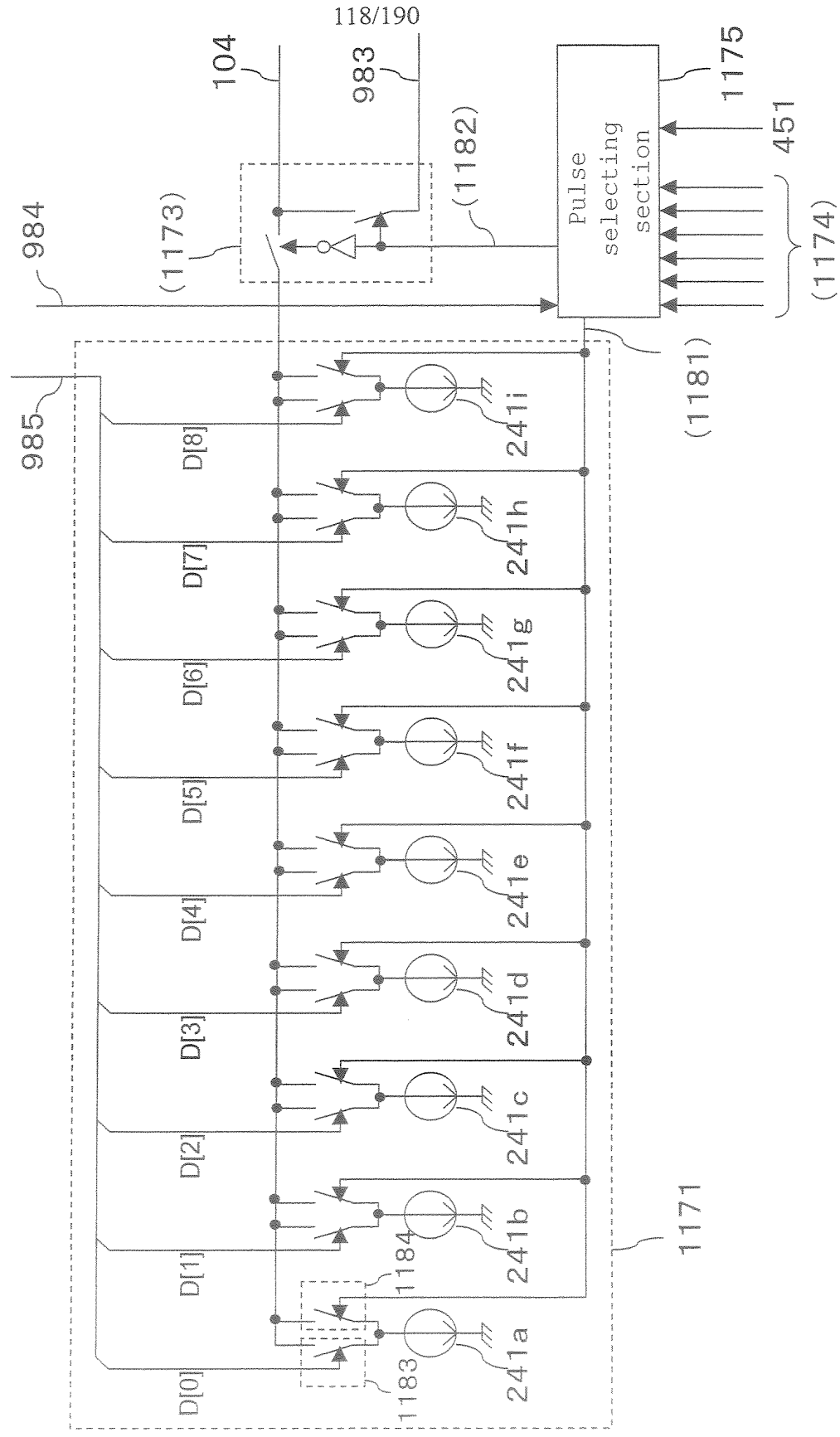


Fig. 119

Precharge determination line(984)			Current precharge control line(1181)	Voltage precharge control line(1182)
Highest bit	Middle bit	Lowest bit		
0	0	0	Always at "L" level	Always at "L" level
0	0	1	Same as 1174a	Same as 451
0	1	0	Same as 1174b	Same as 451
0	1	1	Same as 1174c	Same as 451
1	0	0	Same as 1174d	Same as 451
1	0	1	Same as 1174e	Same as 451
1	1	0	Same as 1174f	Same as 451
1	1	1	Always at "L" level	Same as 451

Fig. 120

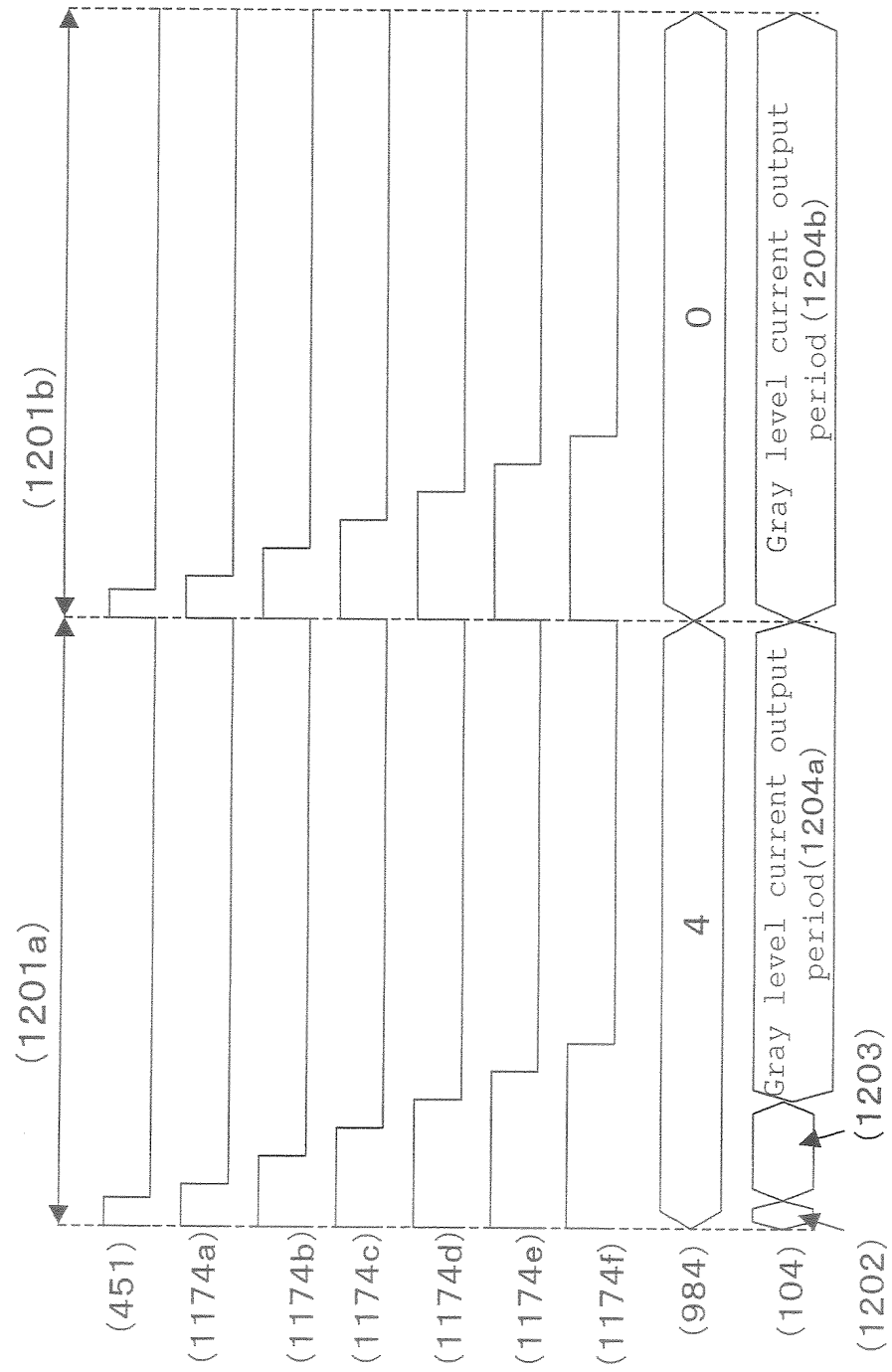


Fig. 121 (a)

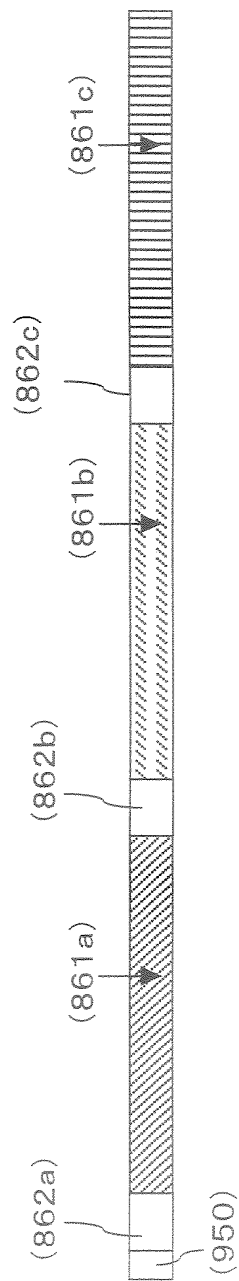


Fig. 121 (b)

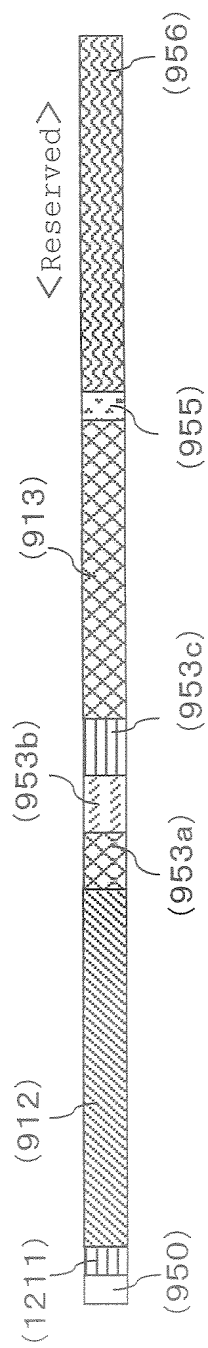


Fig. 121 (c)

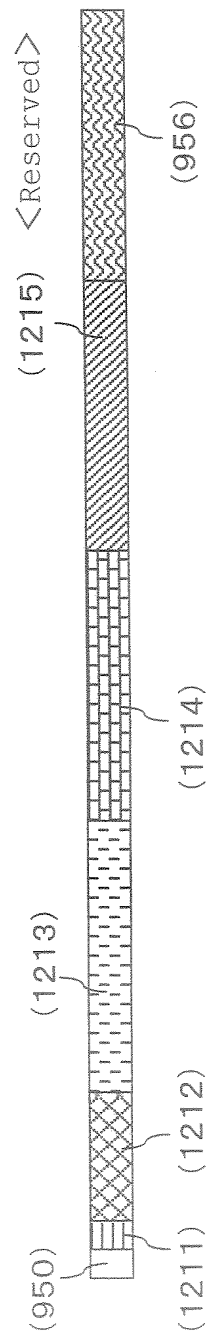


Fig. 122

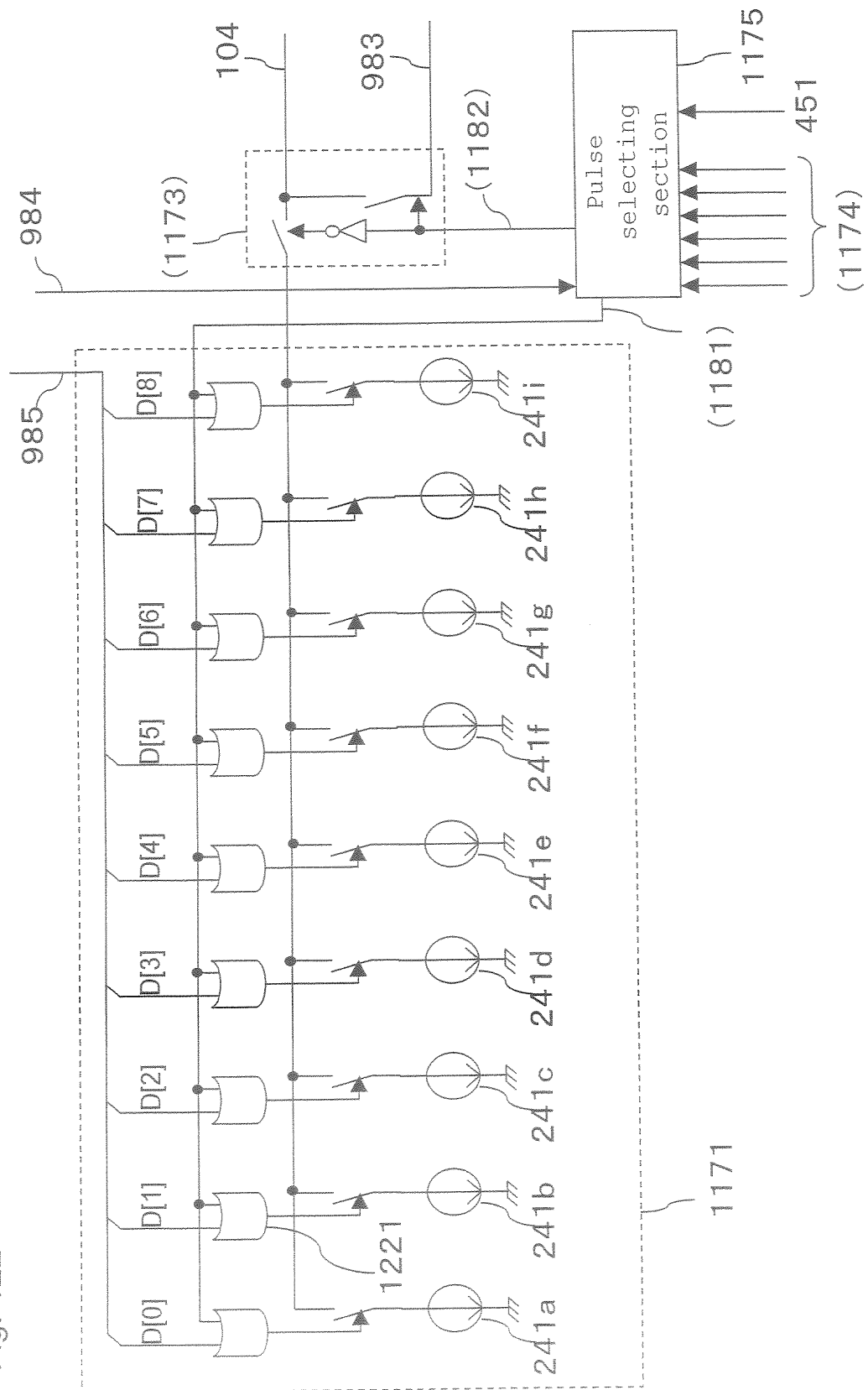


Fig. 123

Gray level	Precharge current output period	Use of only current precharge pulse
0	None	None (only voltage precharge)
1	0.4 μ s	1174a
2	0.8 μ s	1174b
3	1.2 μ s	1174c
4	1.6 μ s	1174d
5	2.0 μ s	1174e
6~35	2.4 μ s	1174f
36~255	None	None

Fig. 124

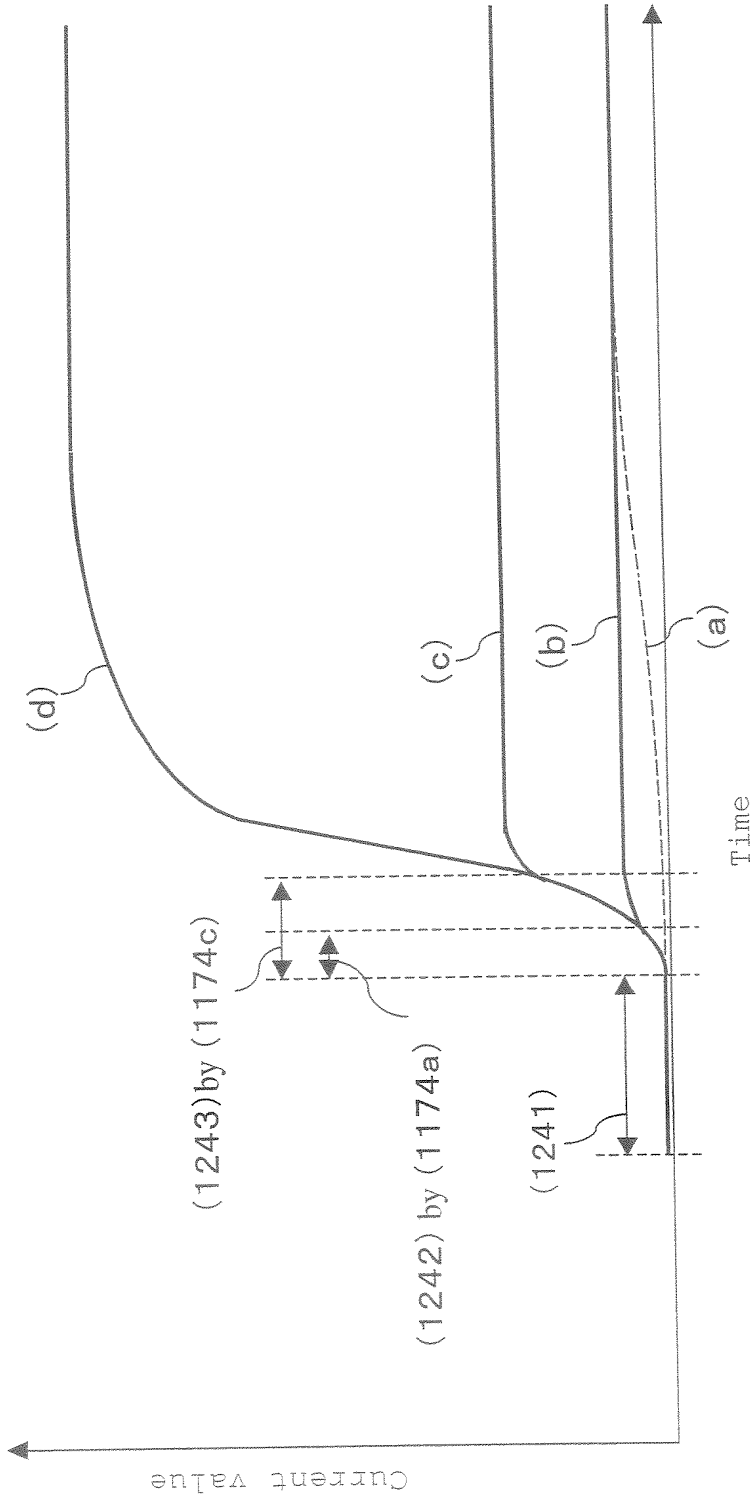


Fig. 125

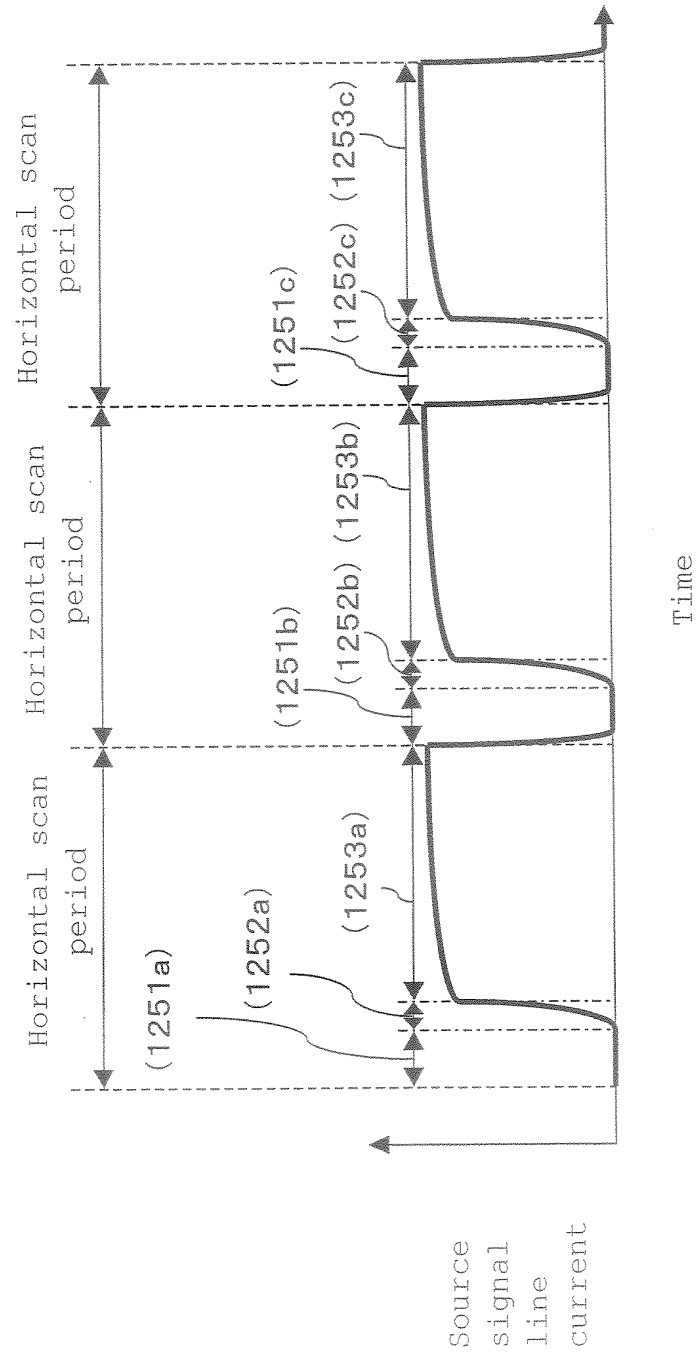


Fig. 126

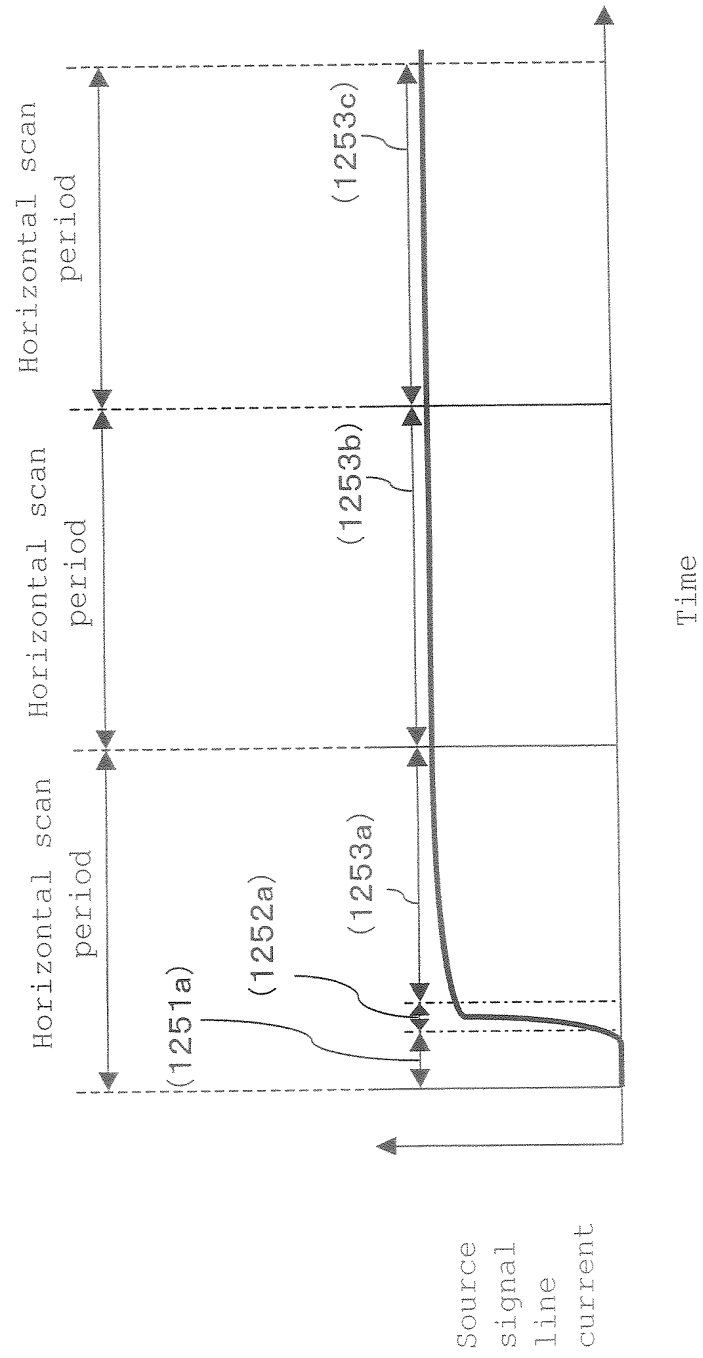


Fig. 127

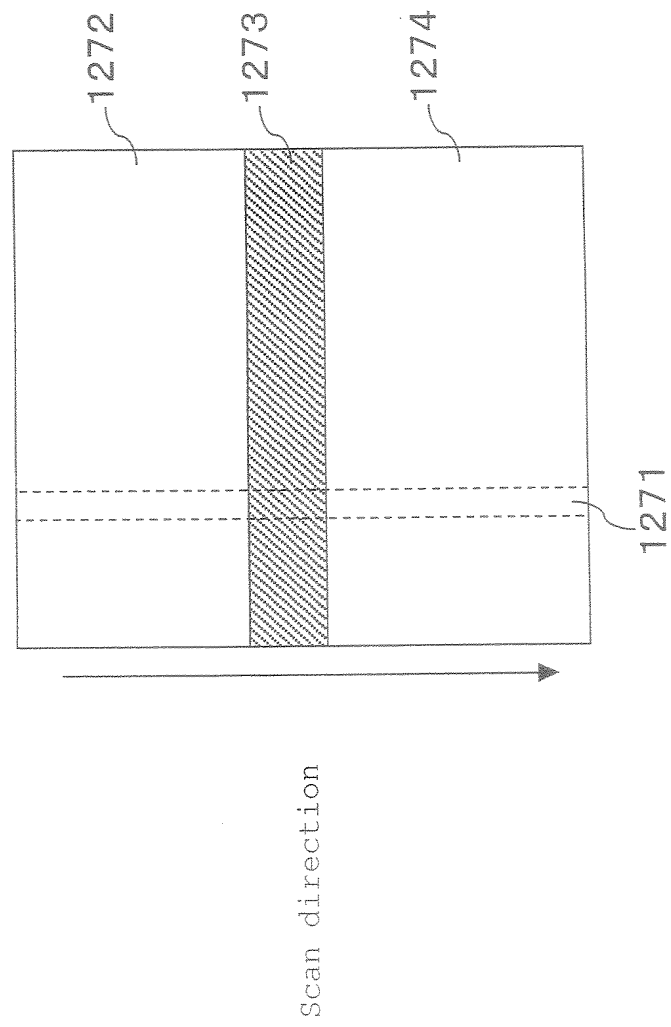


Fig. 128

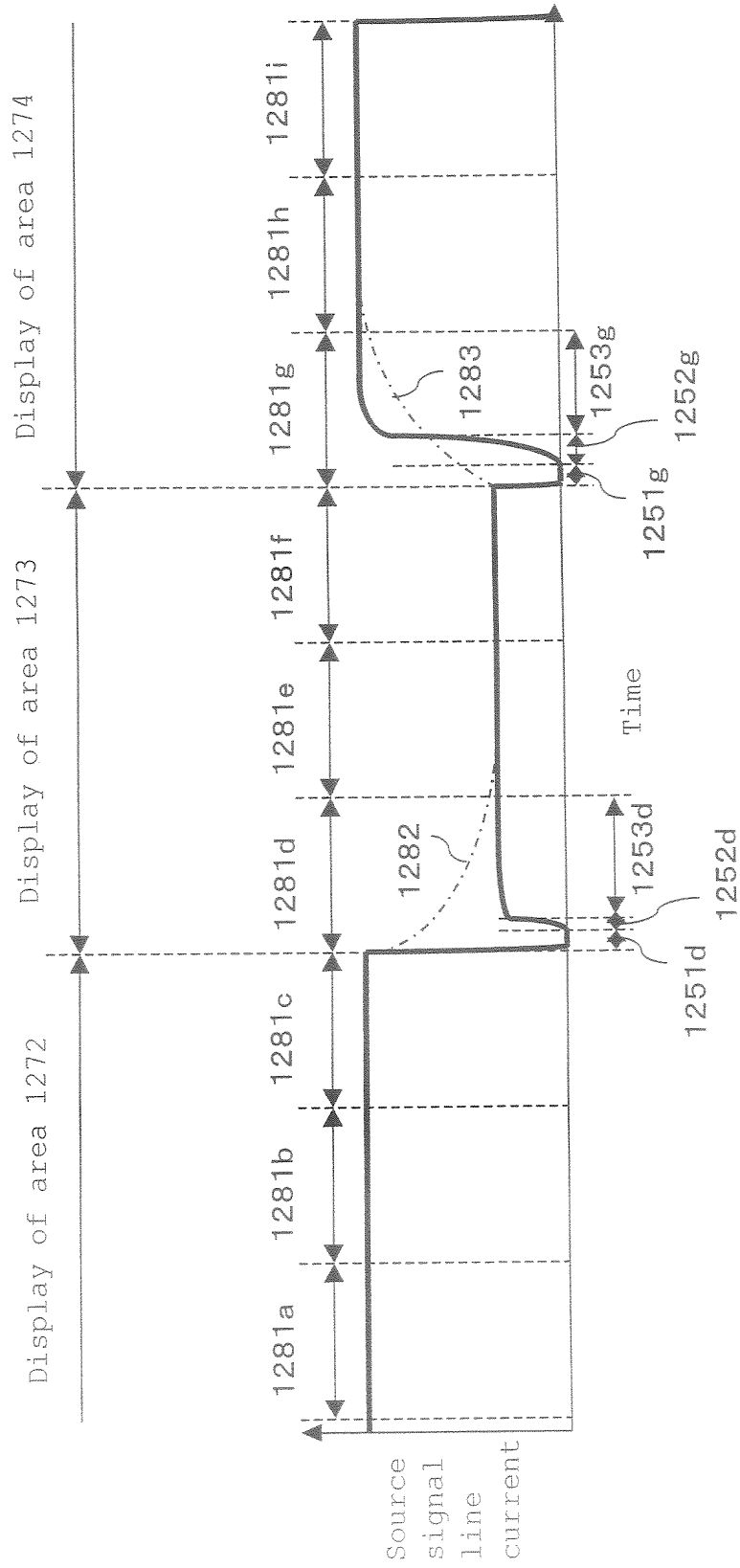


Fig. 129

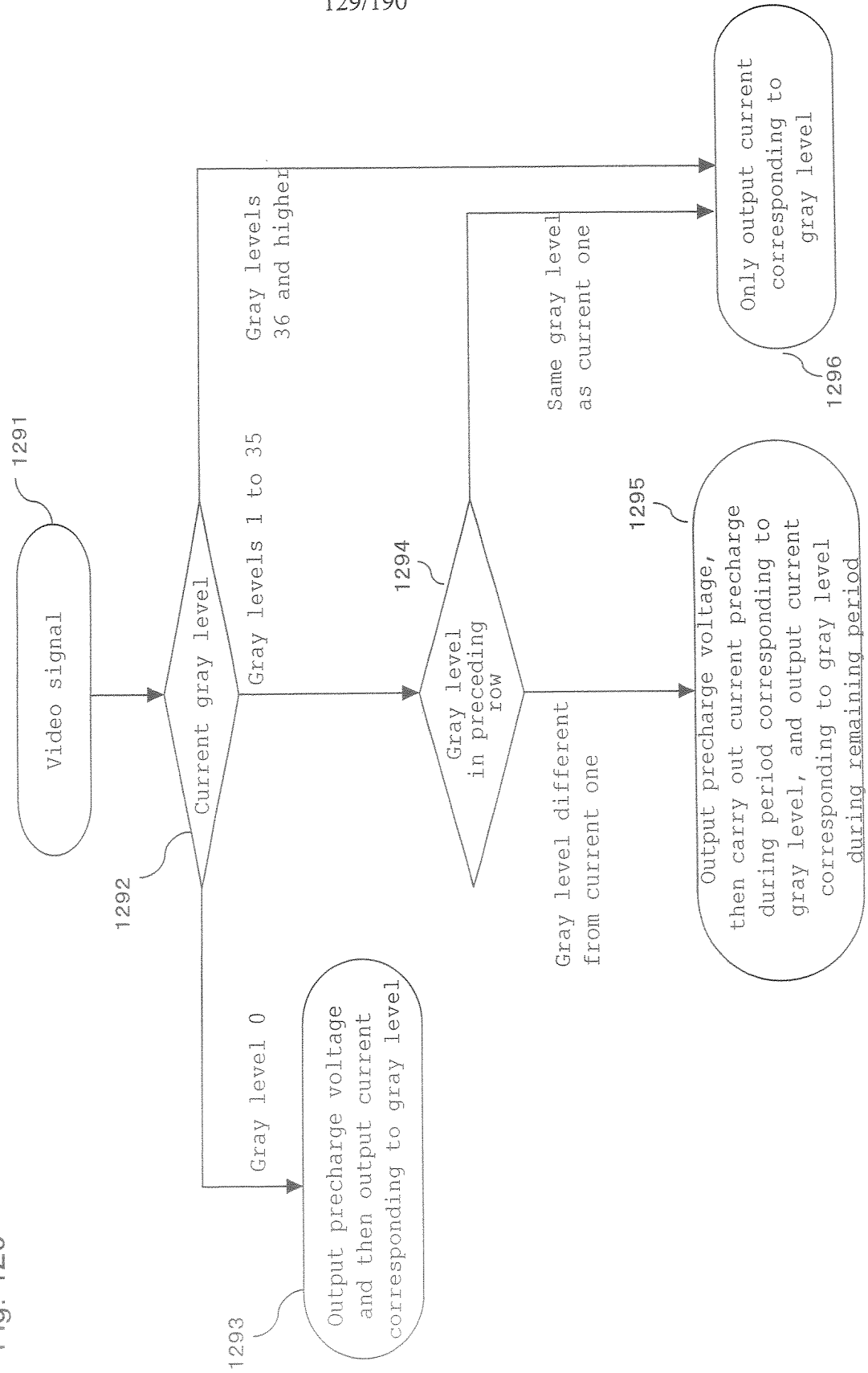


Fig. 130

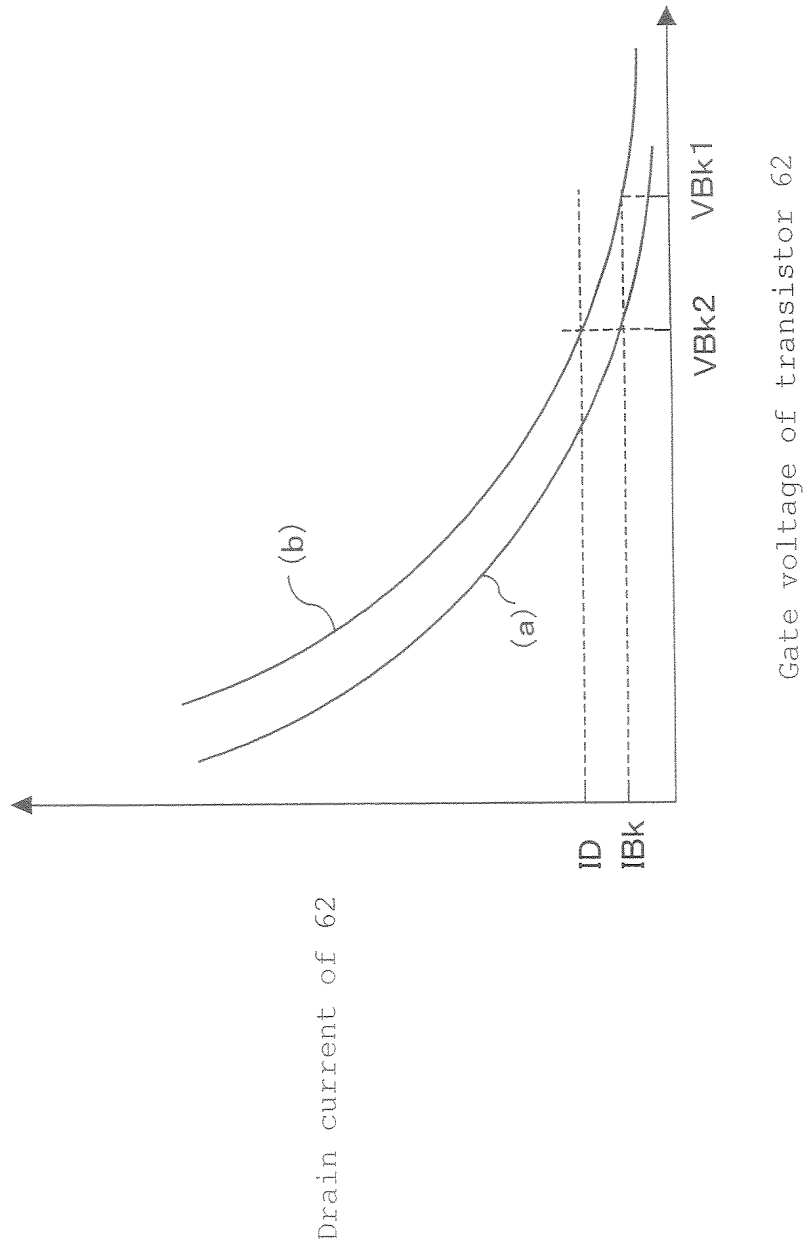


Fig. 131

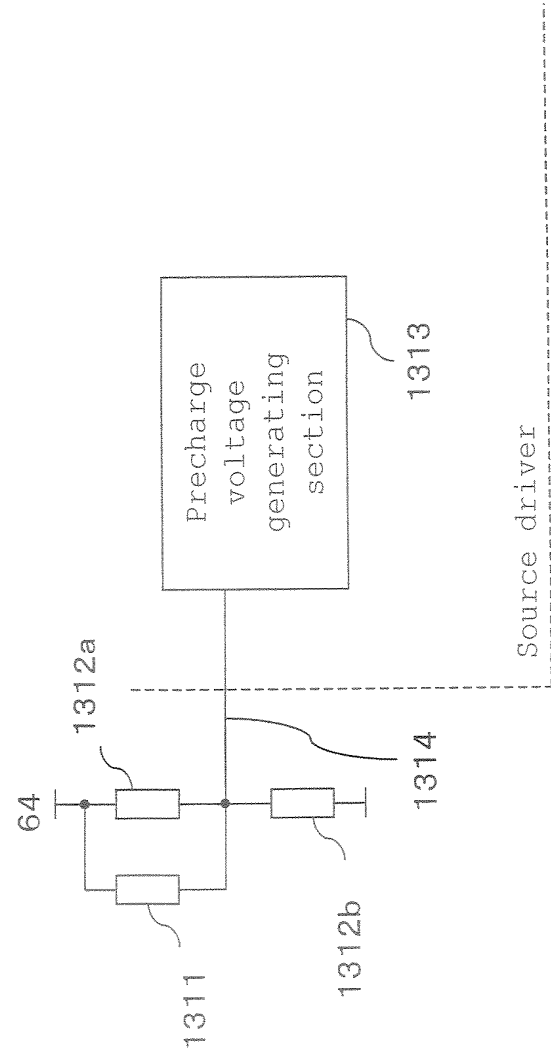


Fig. 132

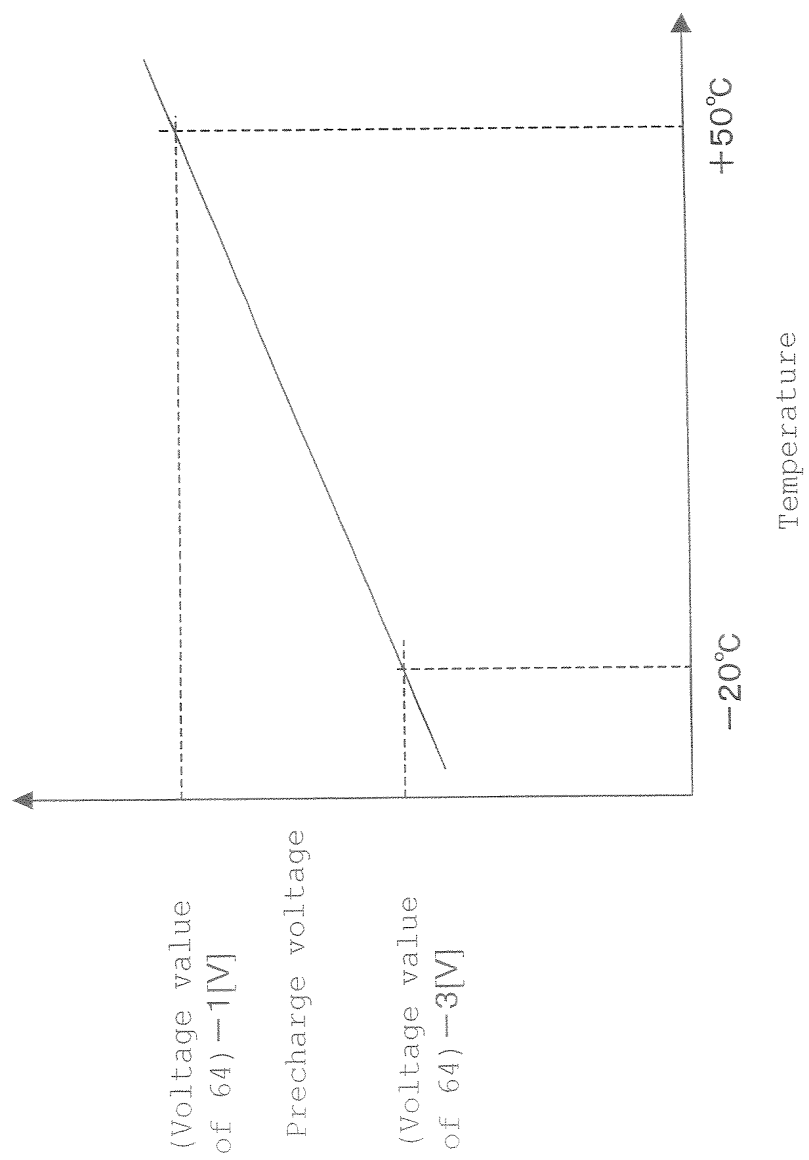


Fig. 133

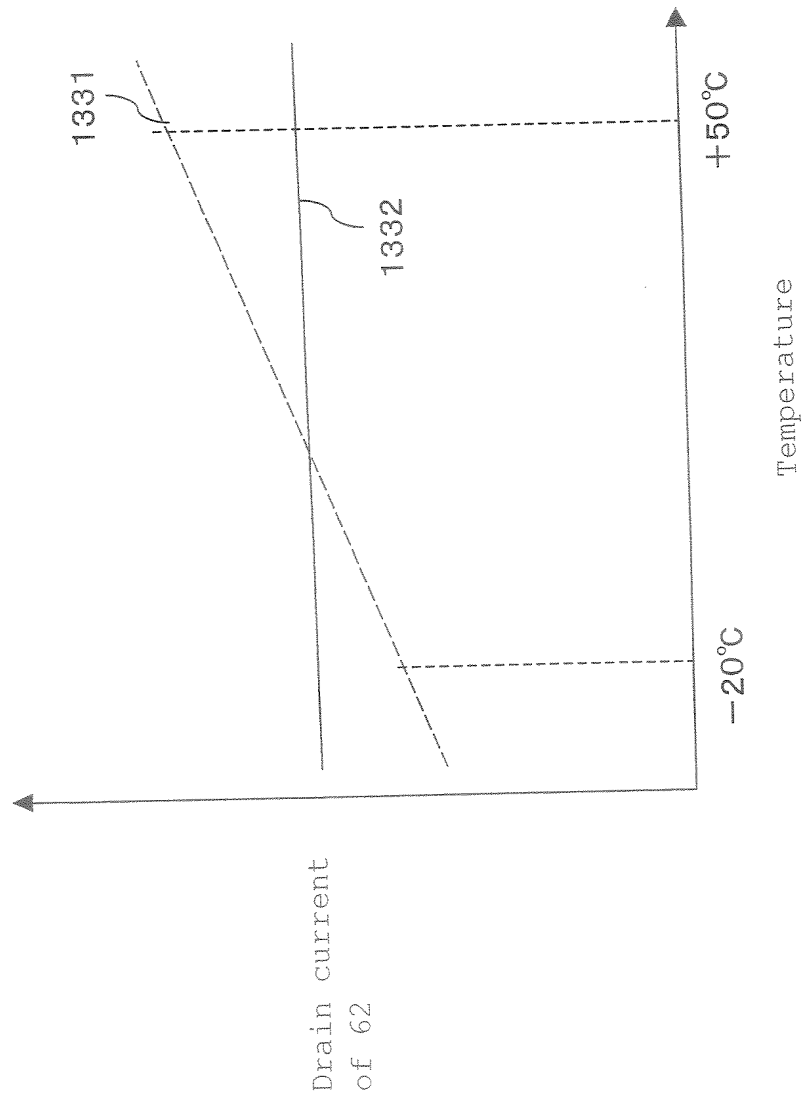


Fig. 134

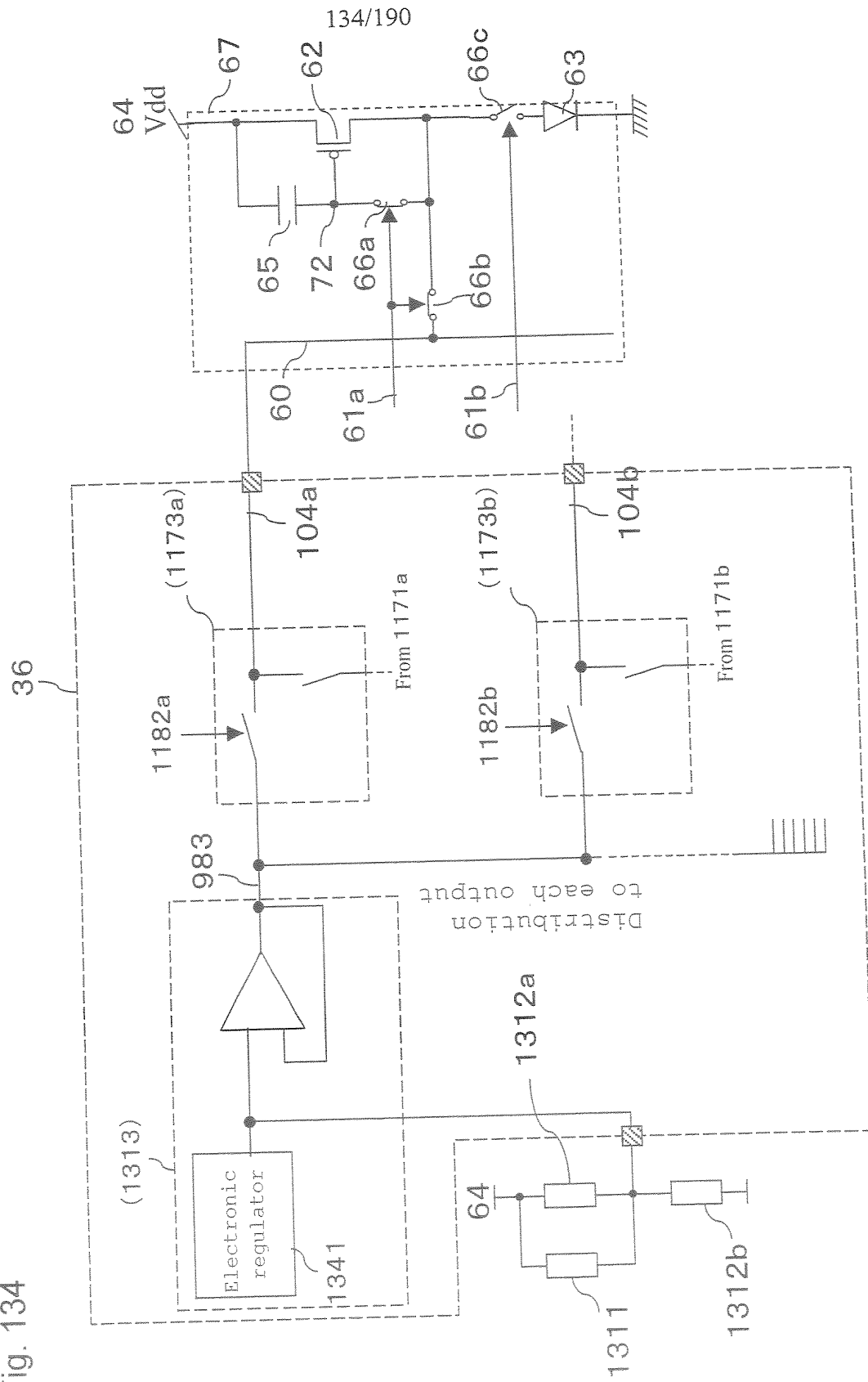


Fig. 135

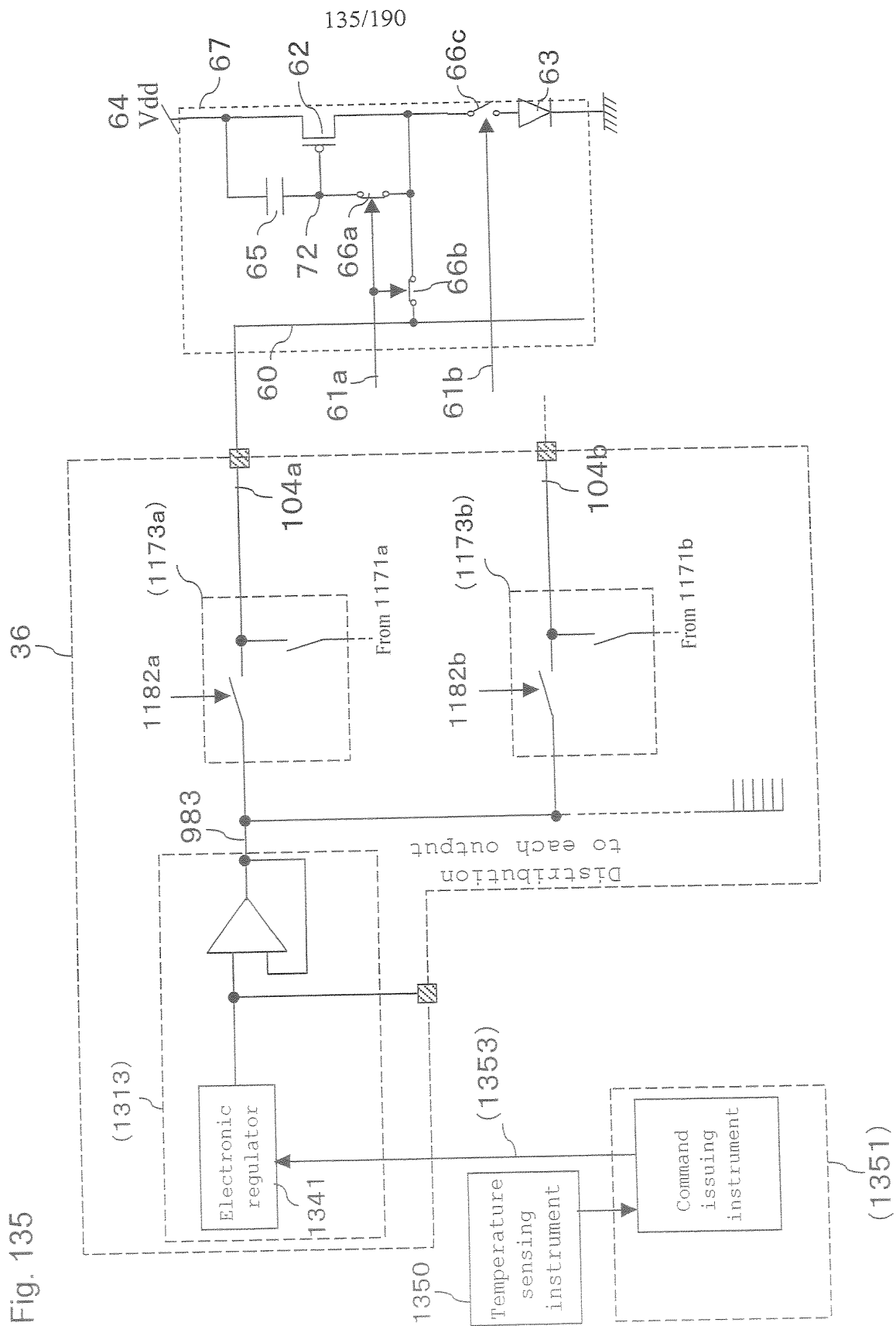


Fig. 136

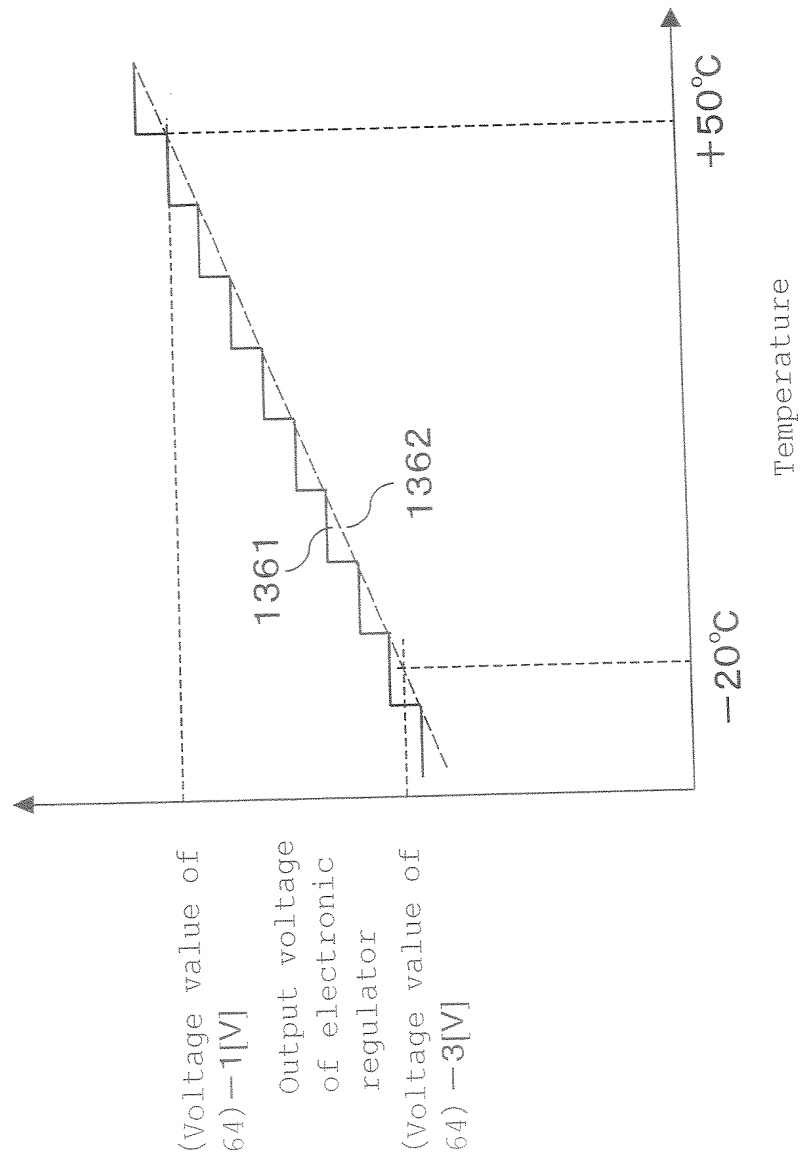


Fig. 137

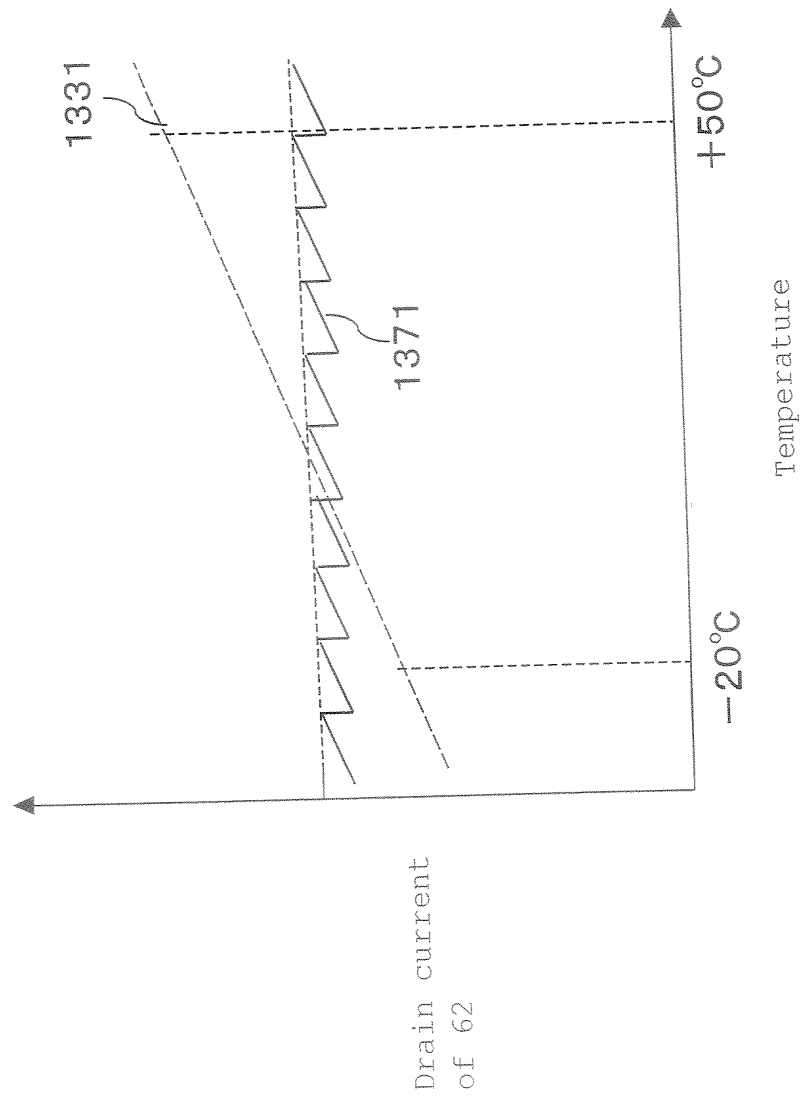


Fig. 138

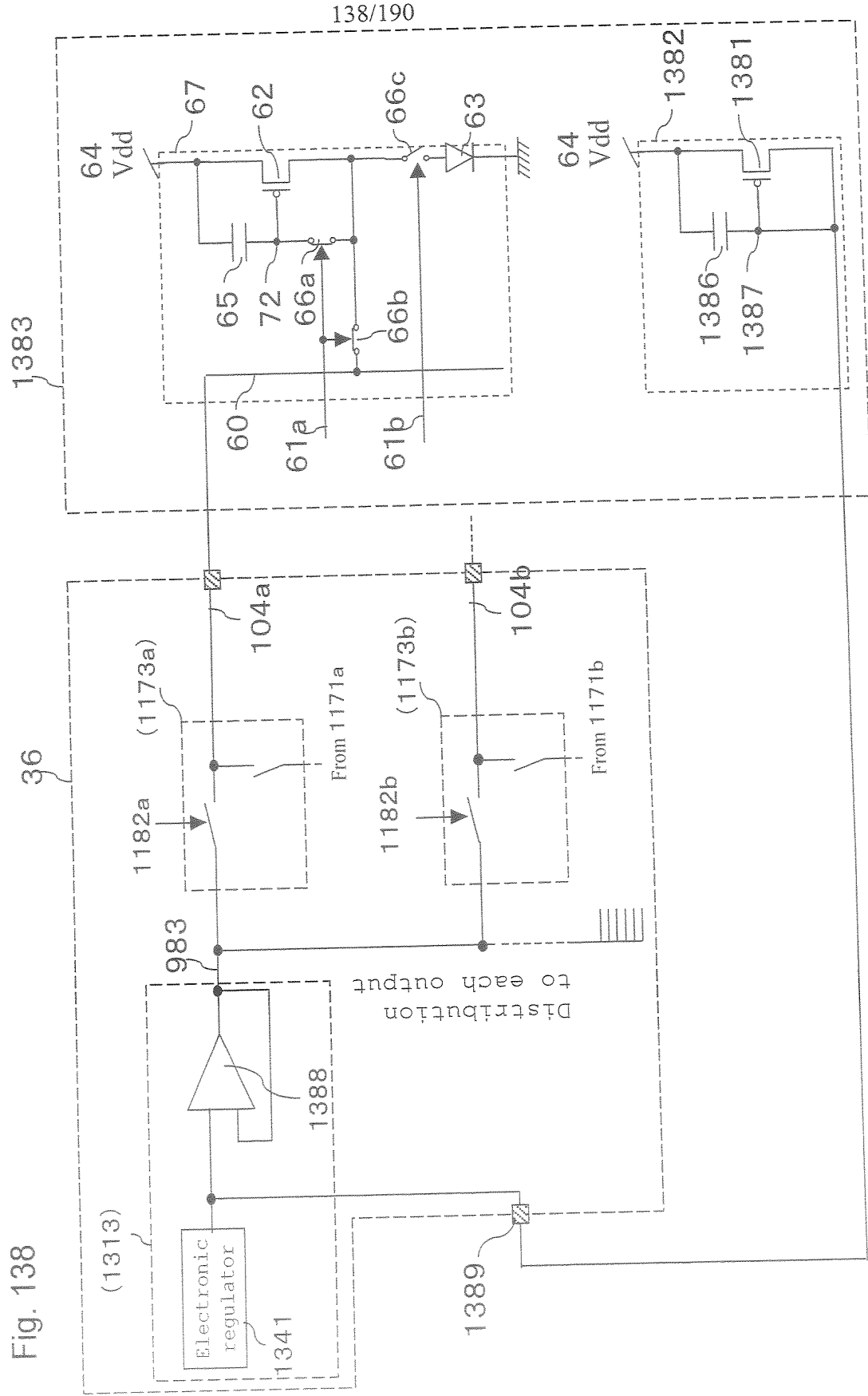


Fig. 139

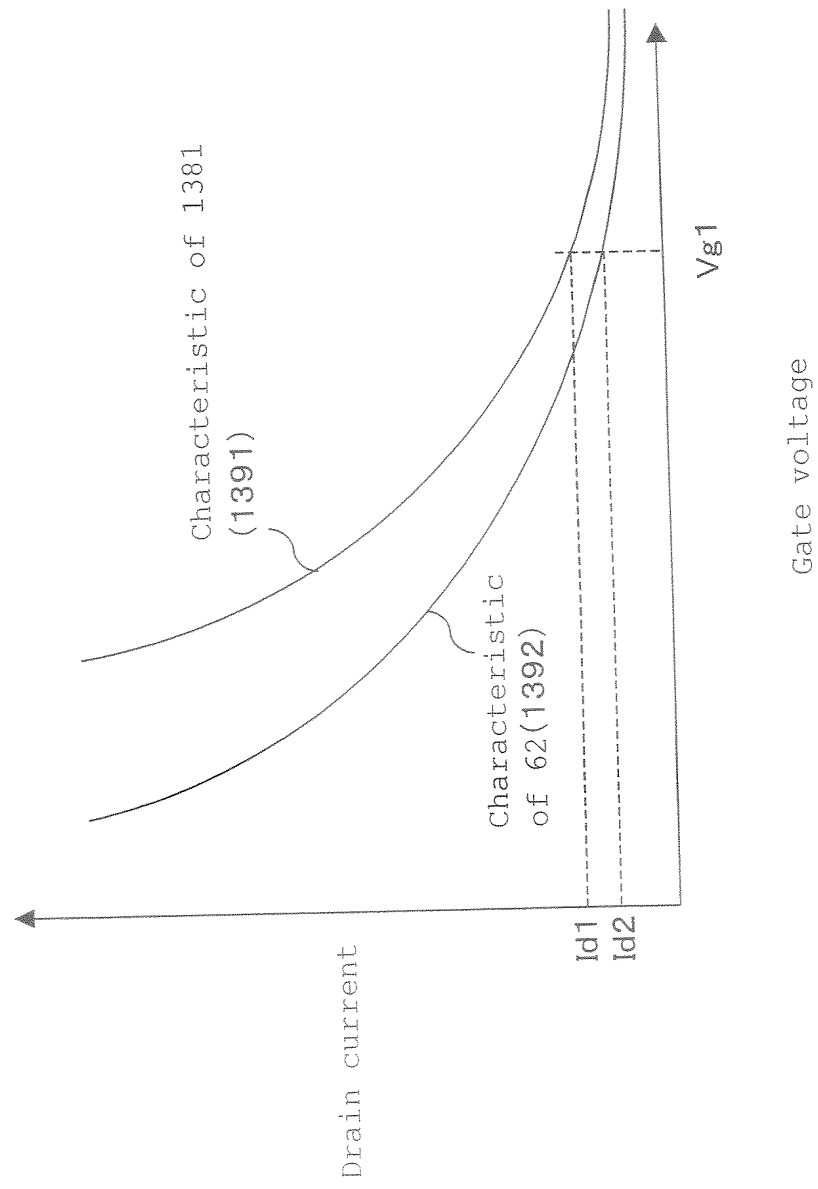


Fig. 140

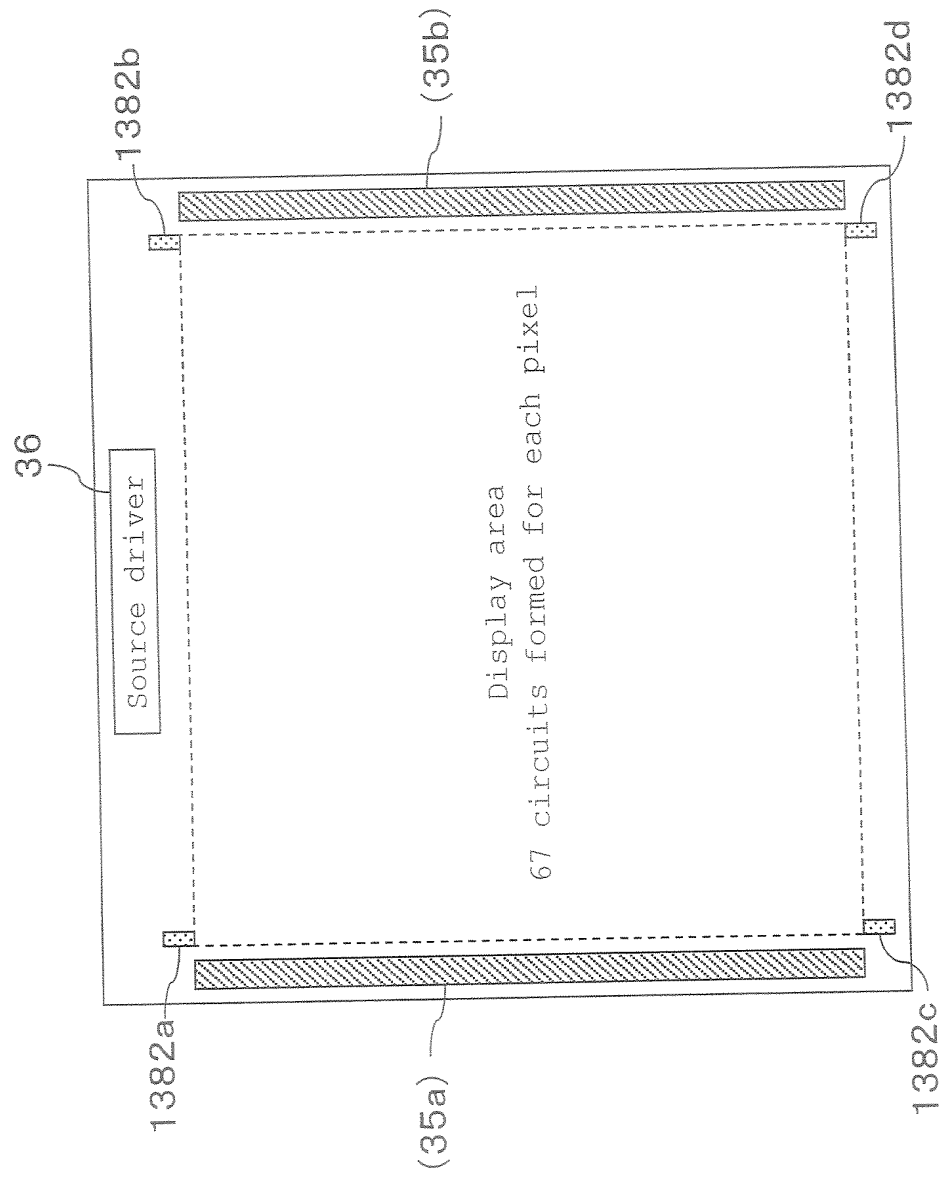


Fig. 141

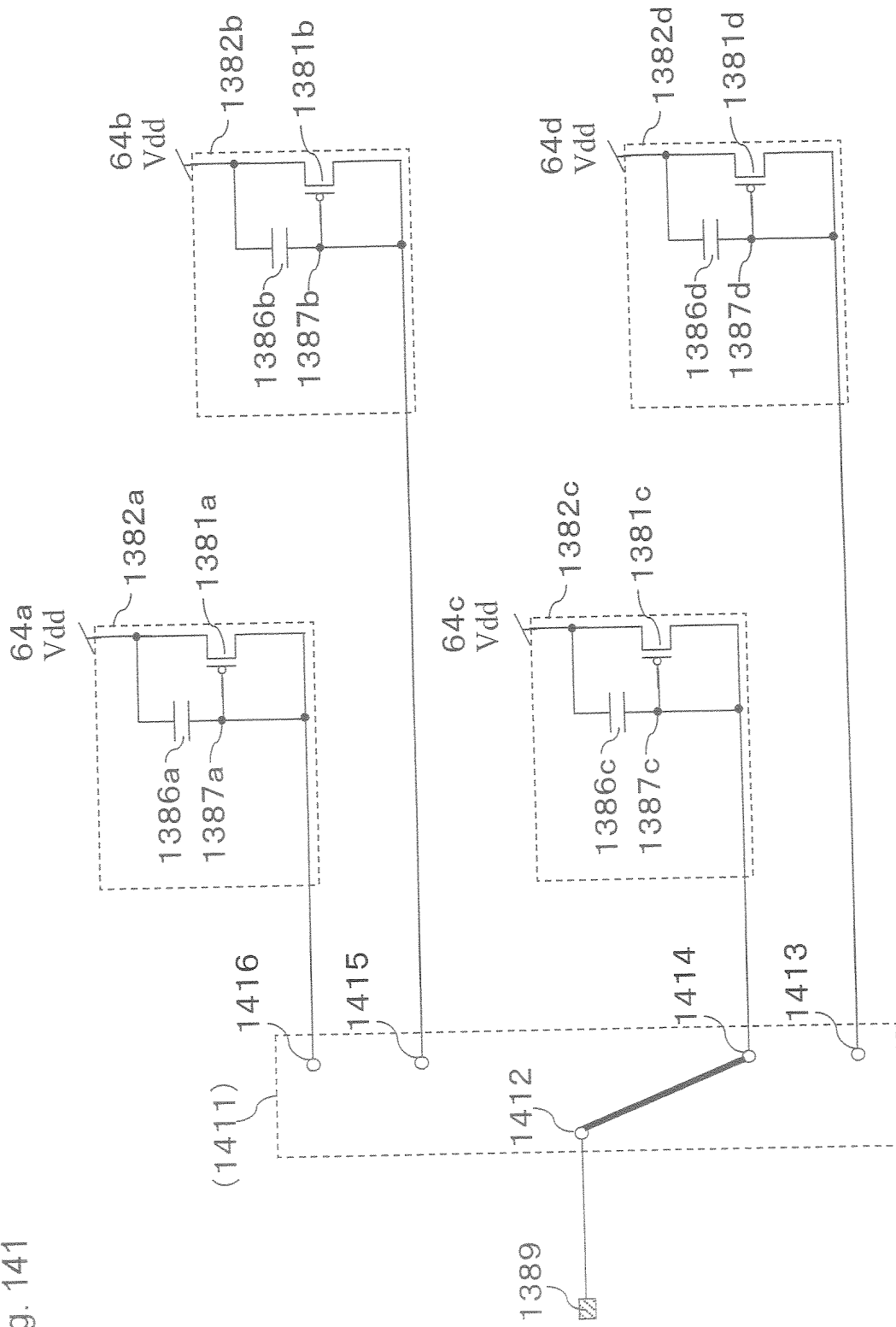


Fig. 142

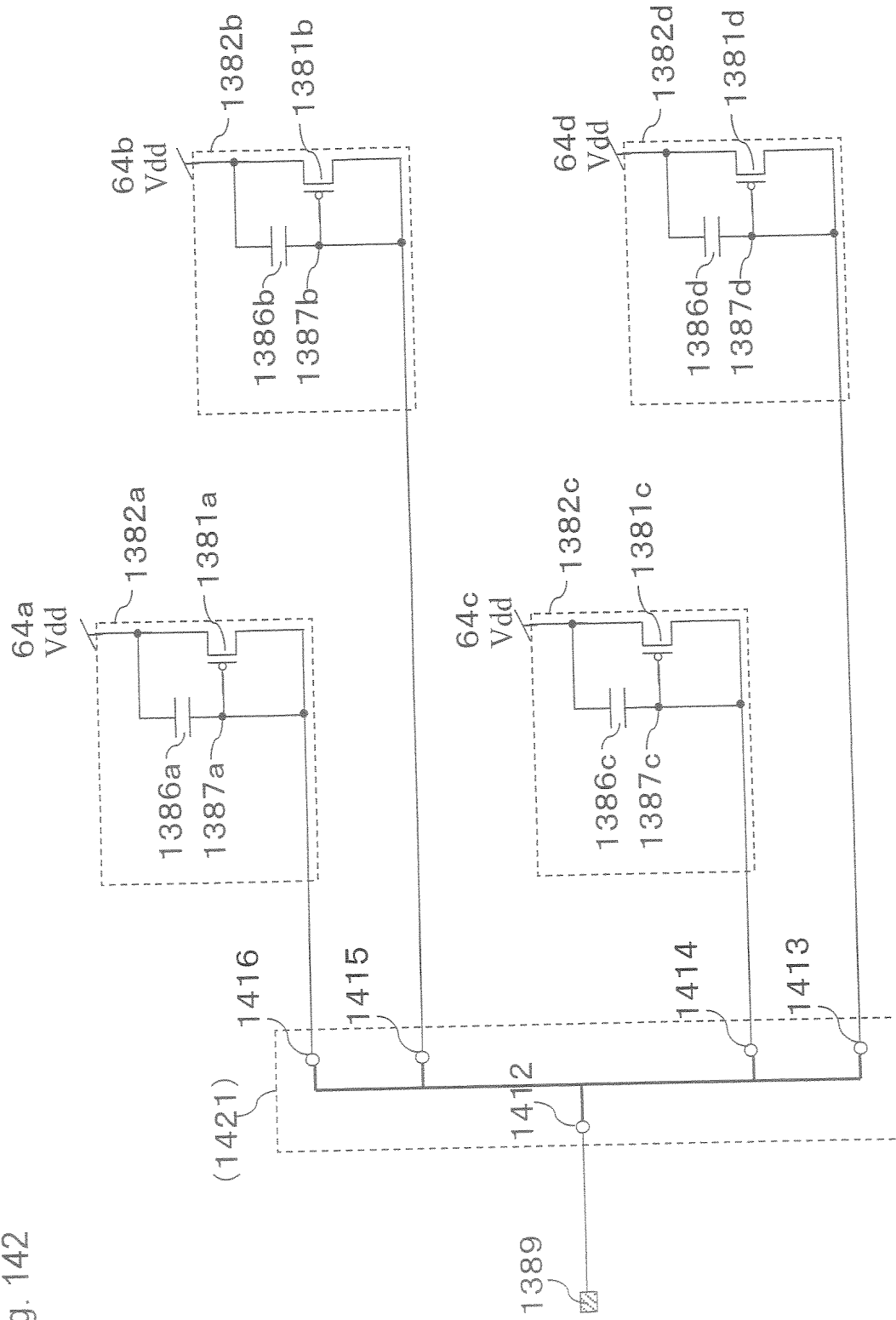


Fig. 143

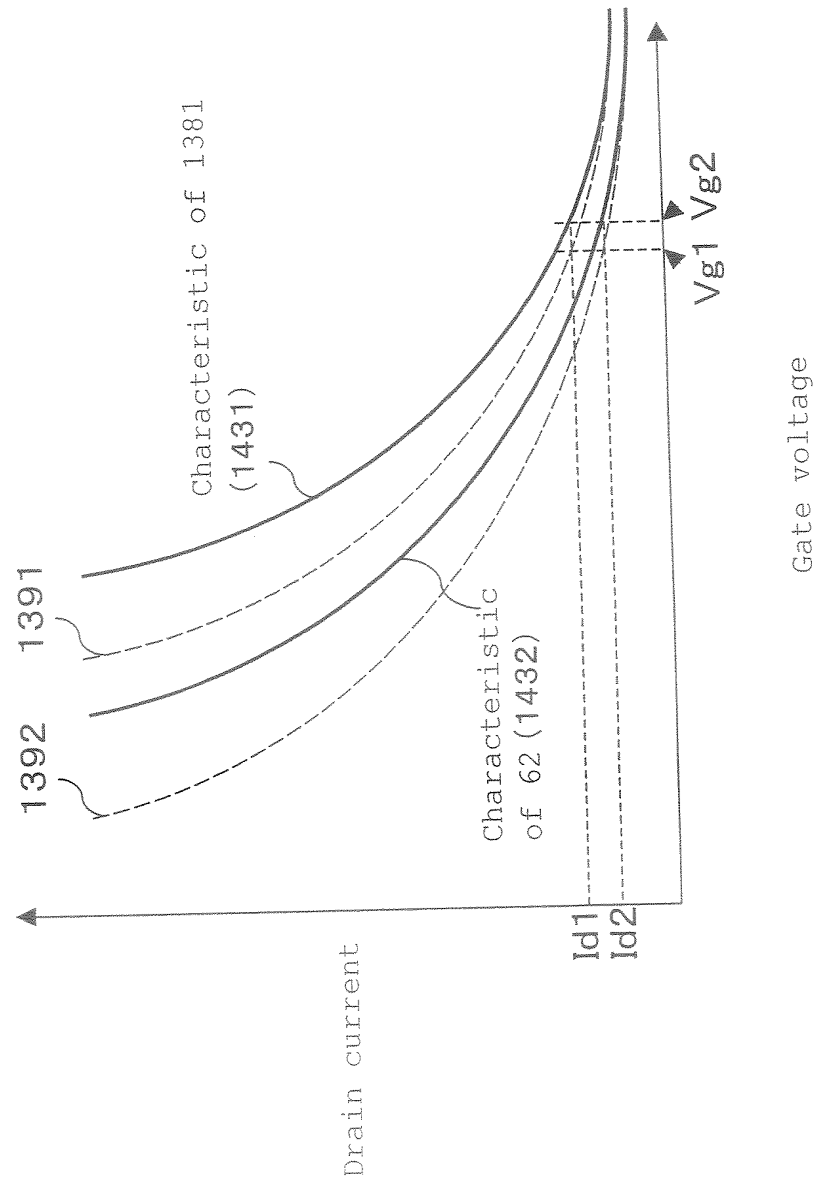


Fig. 144

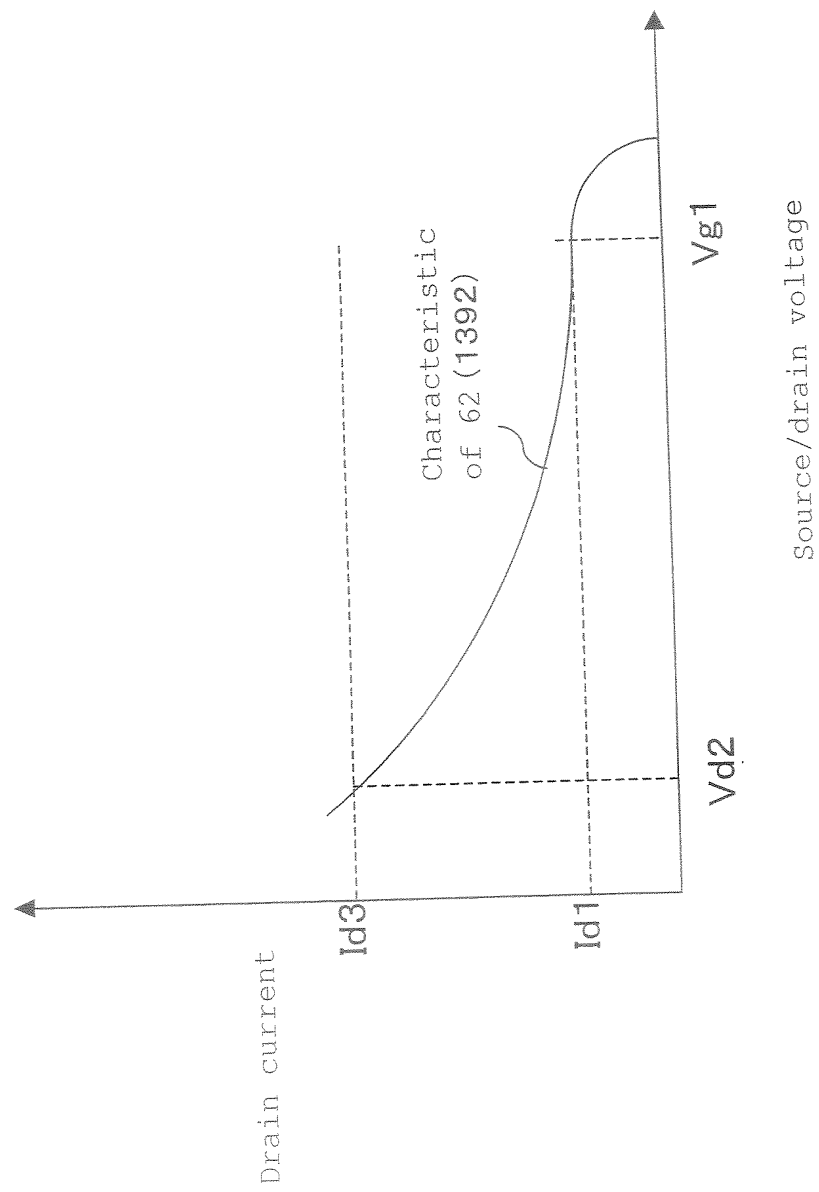


Fig. 145

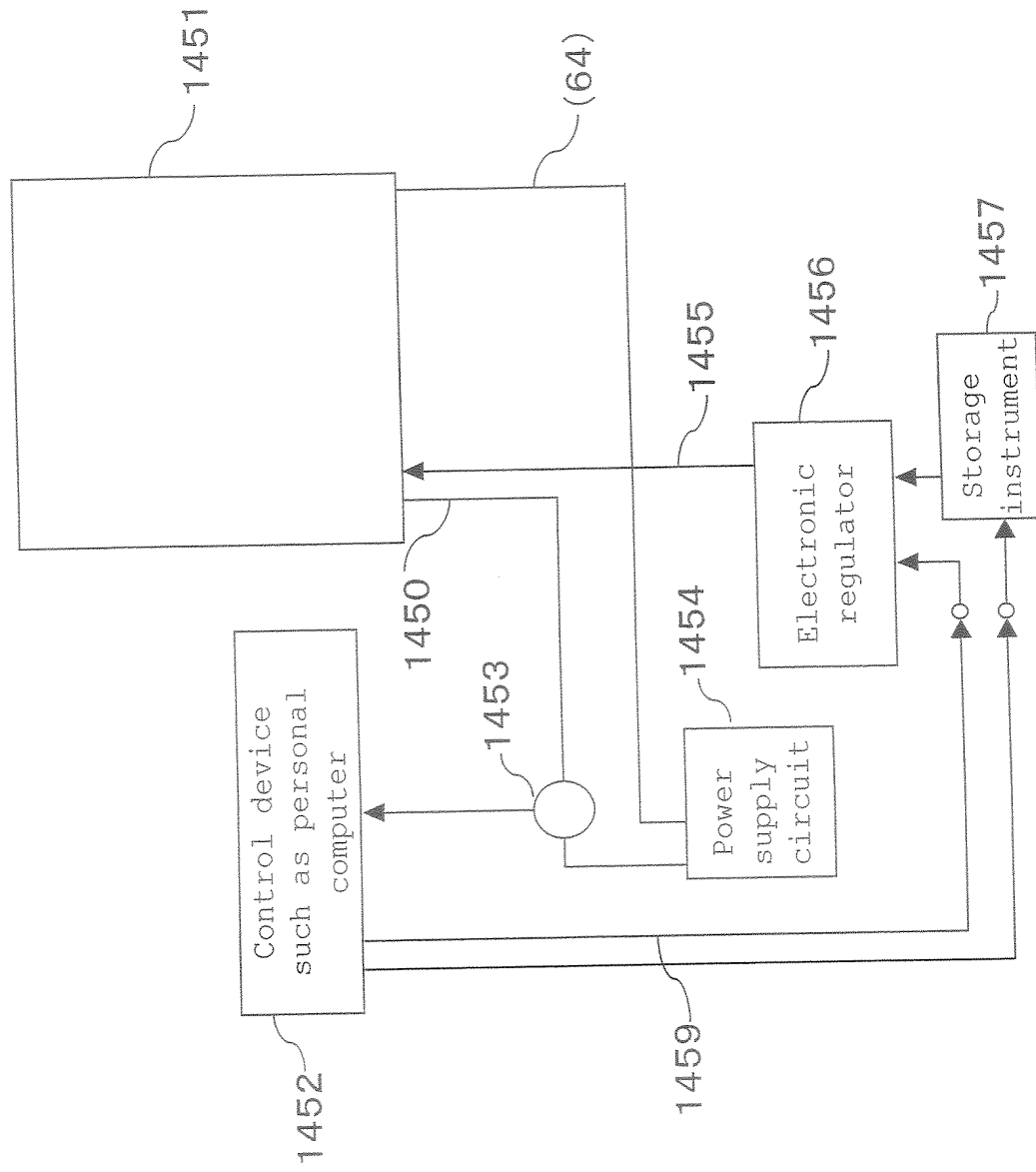


Fig. 146

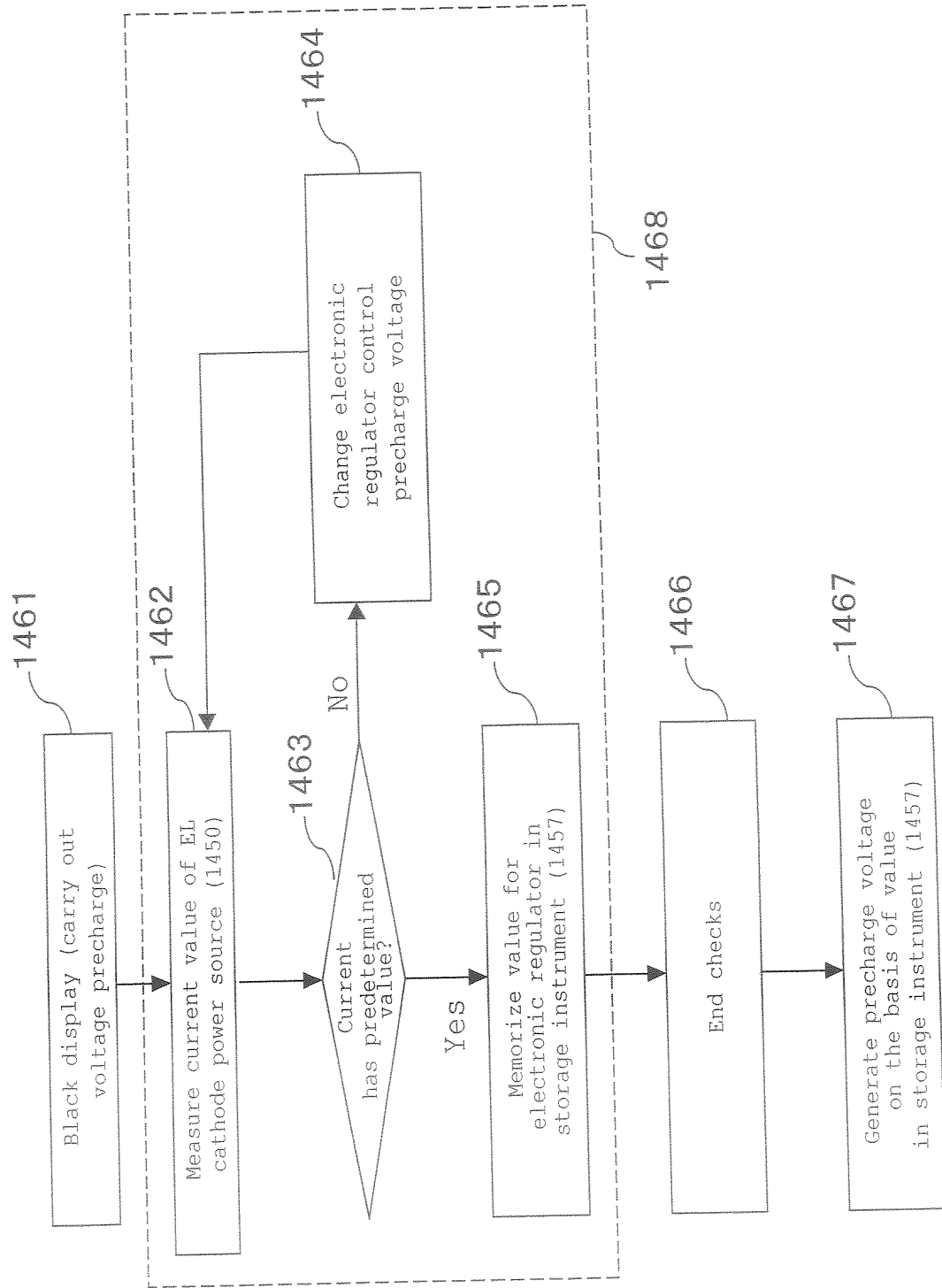


Fig. 147

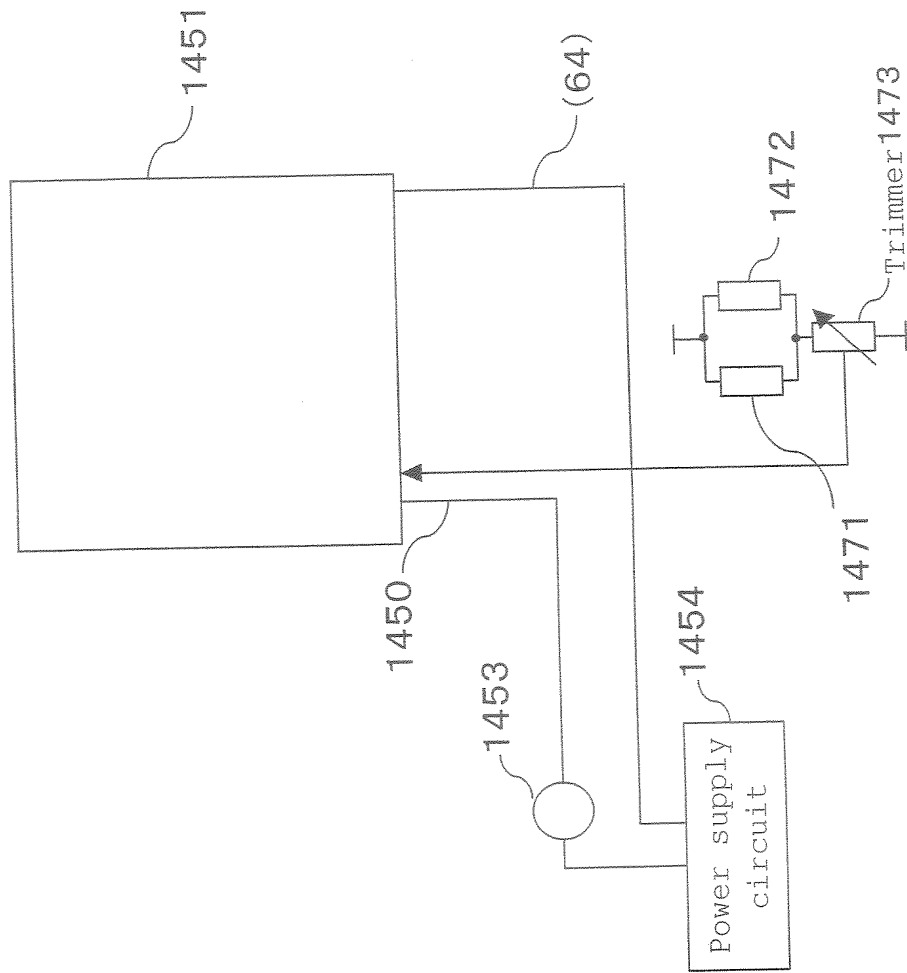
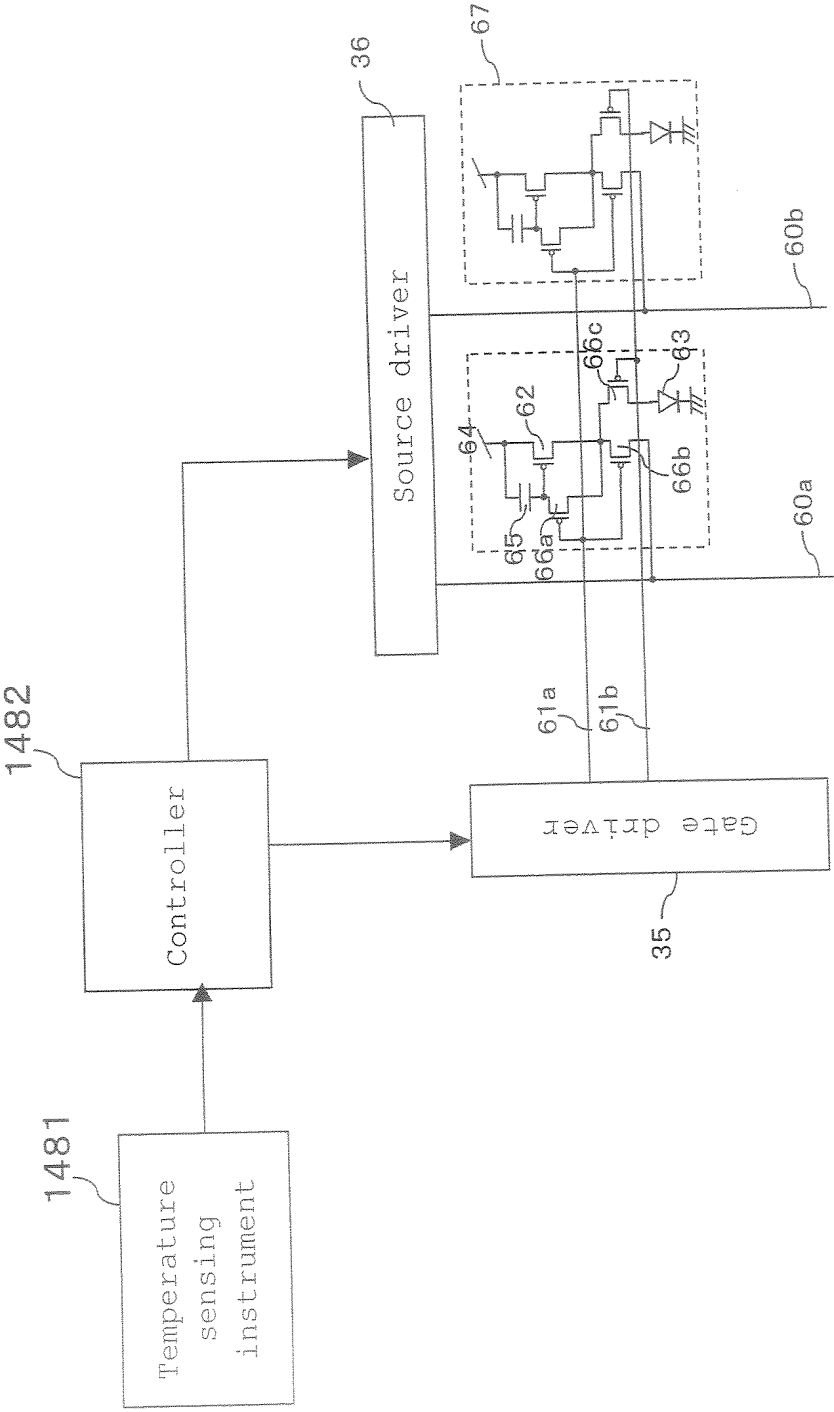


Fig. 148



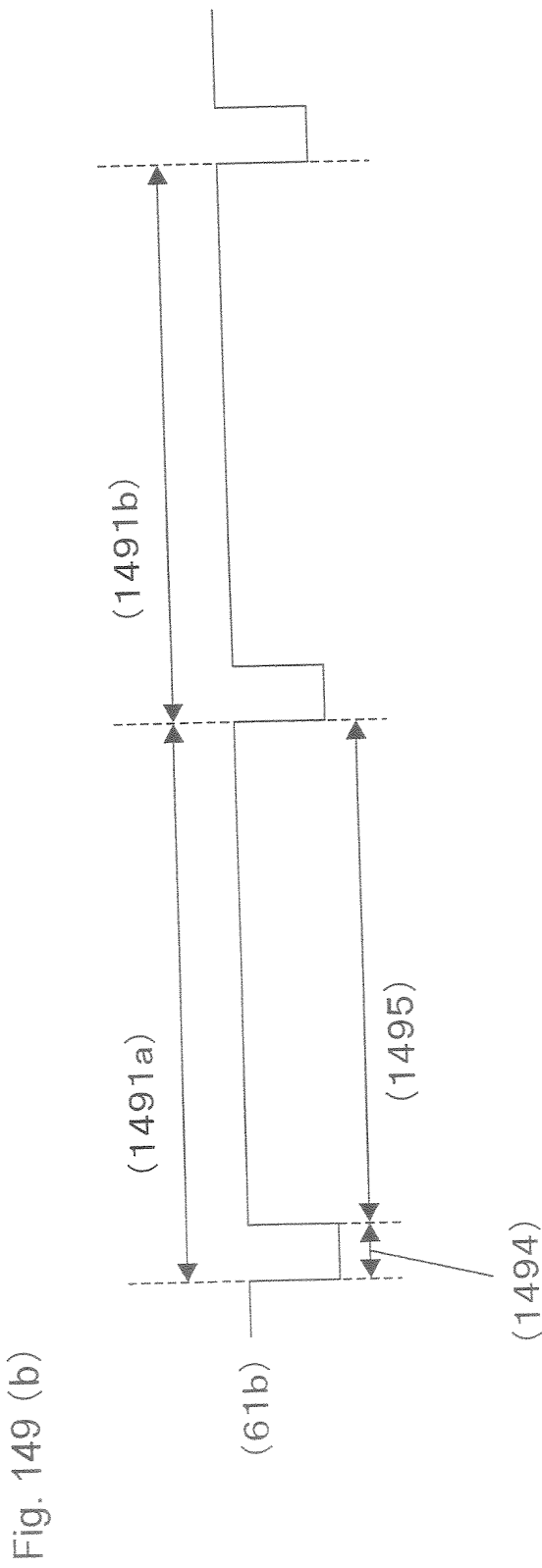
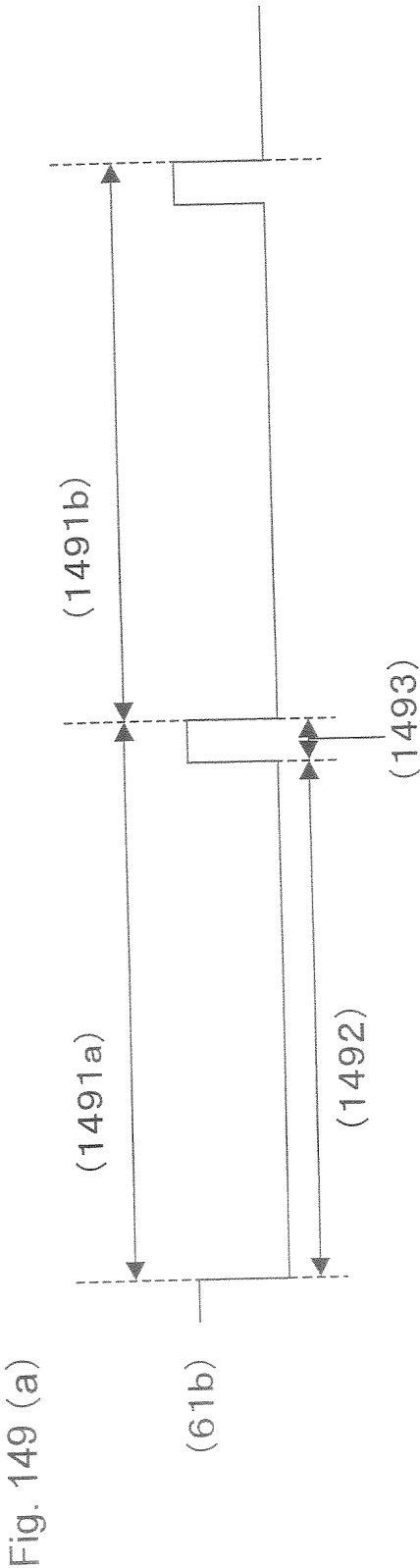


Fig. 150 (a)

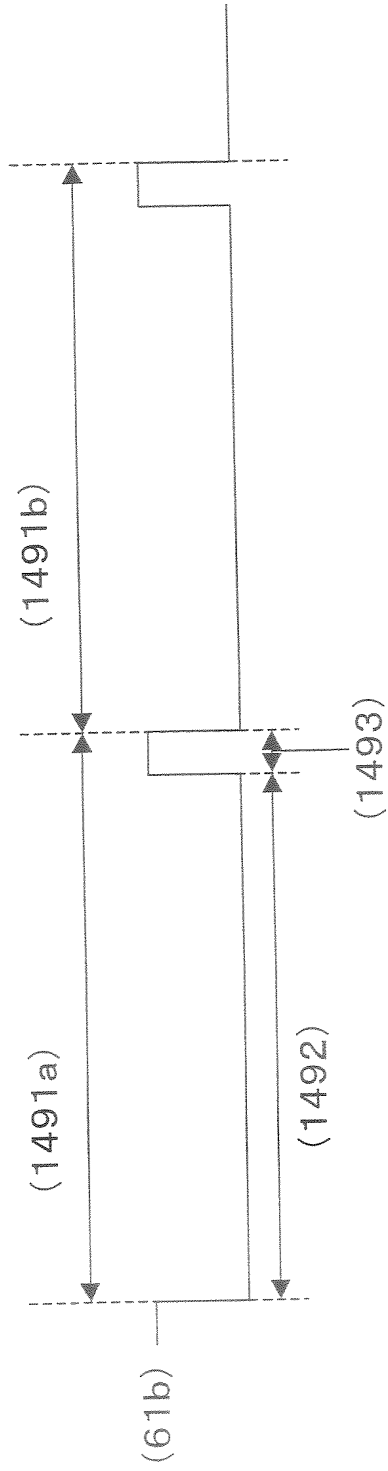
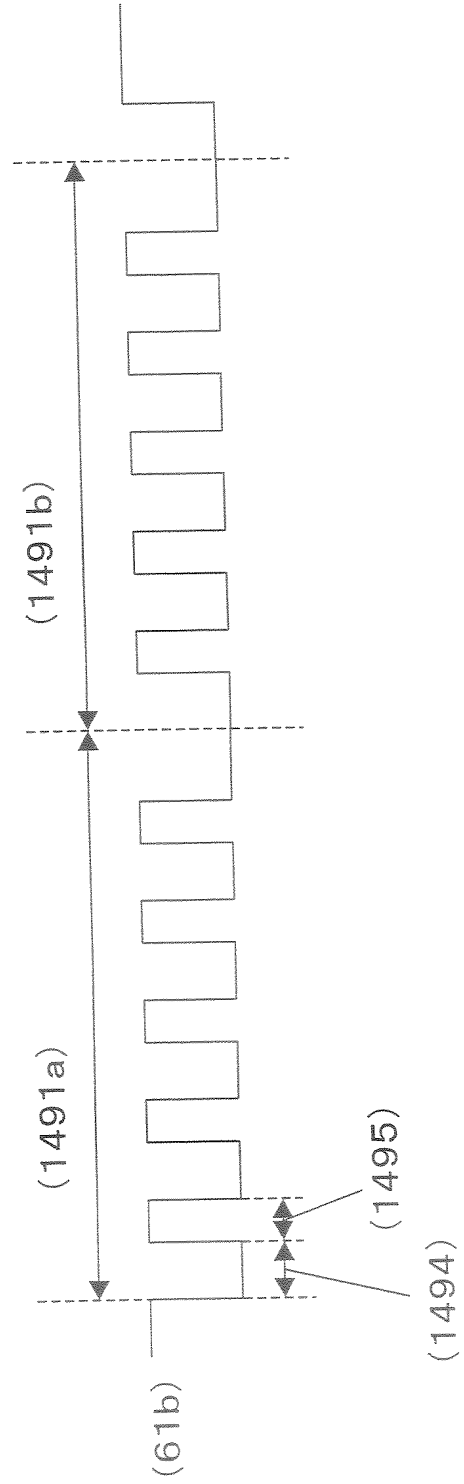


Fig. 150 (b)



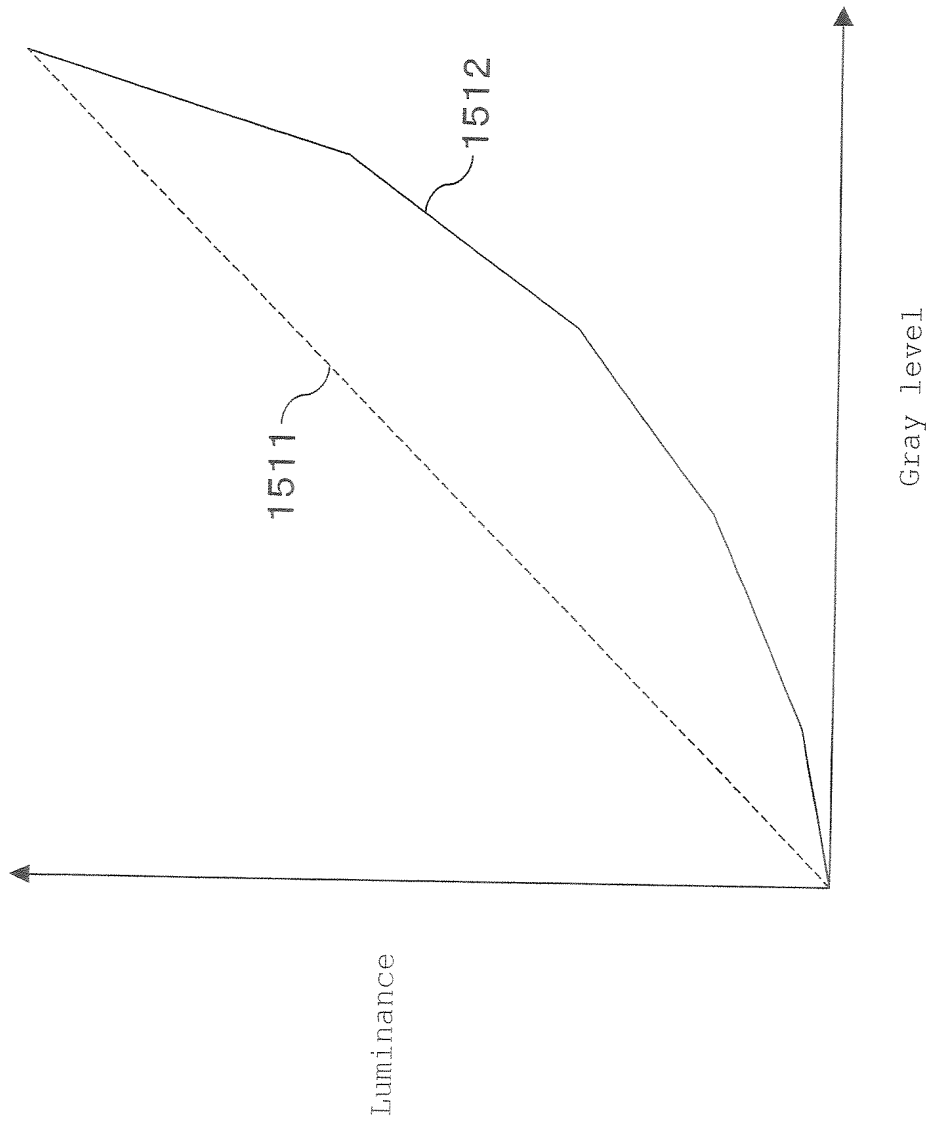


Fig. 151

Fig. 152

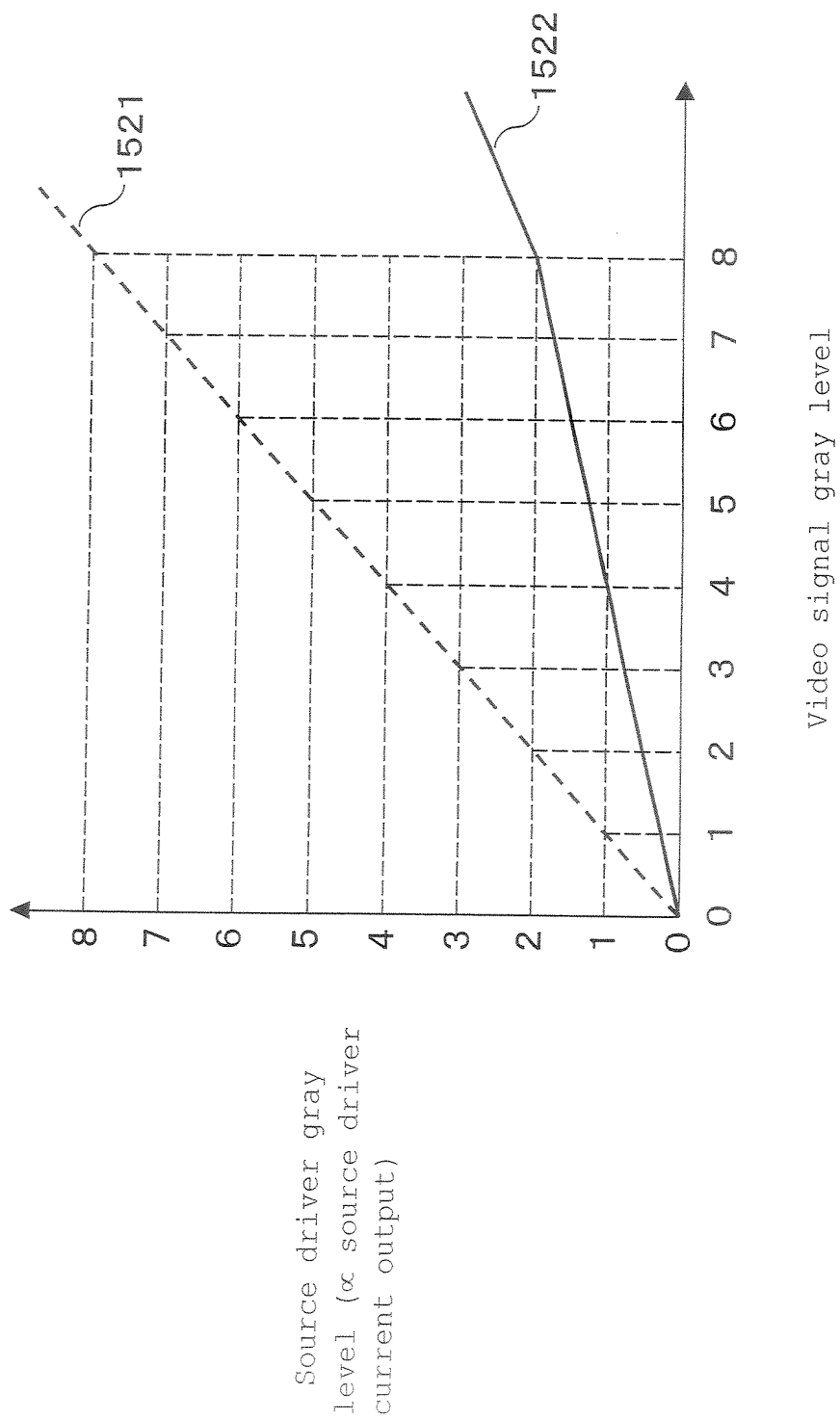


Fig. 153

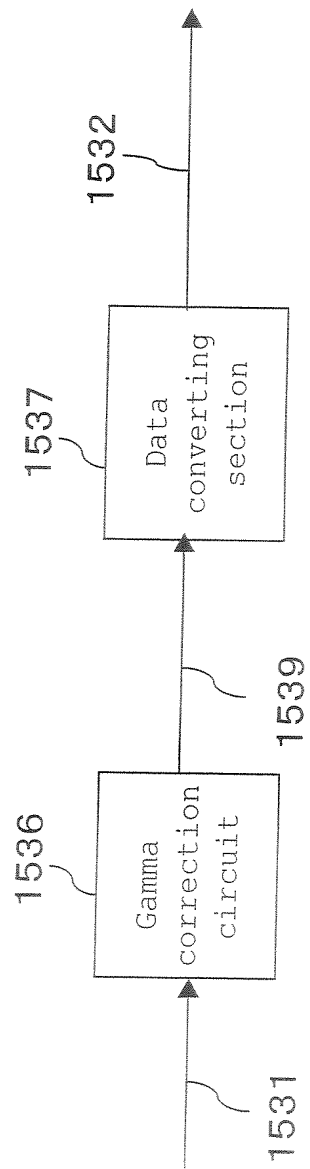


Fig. 154

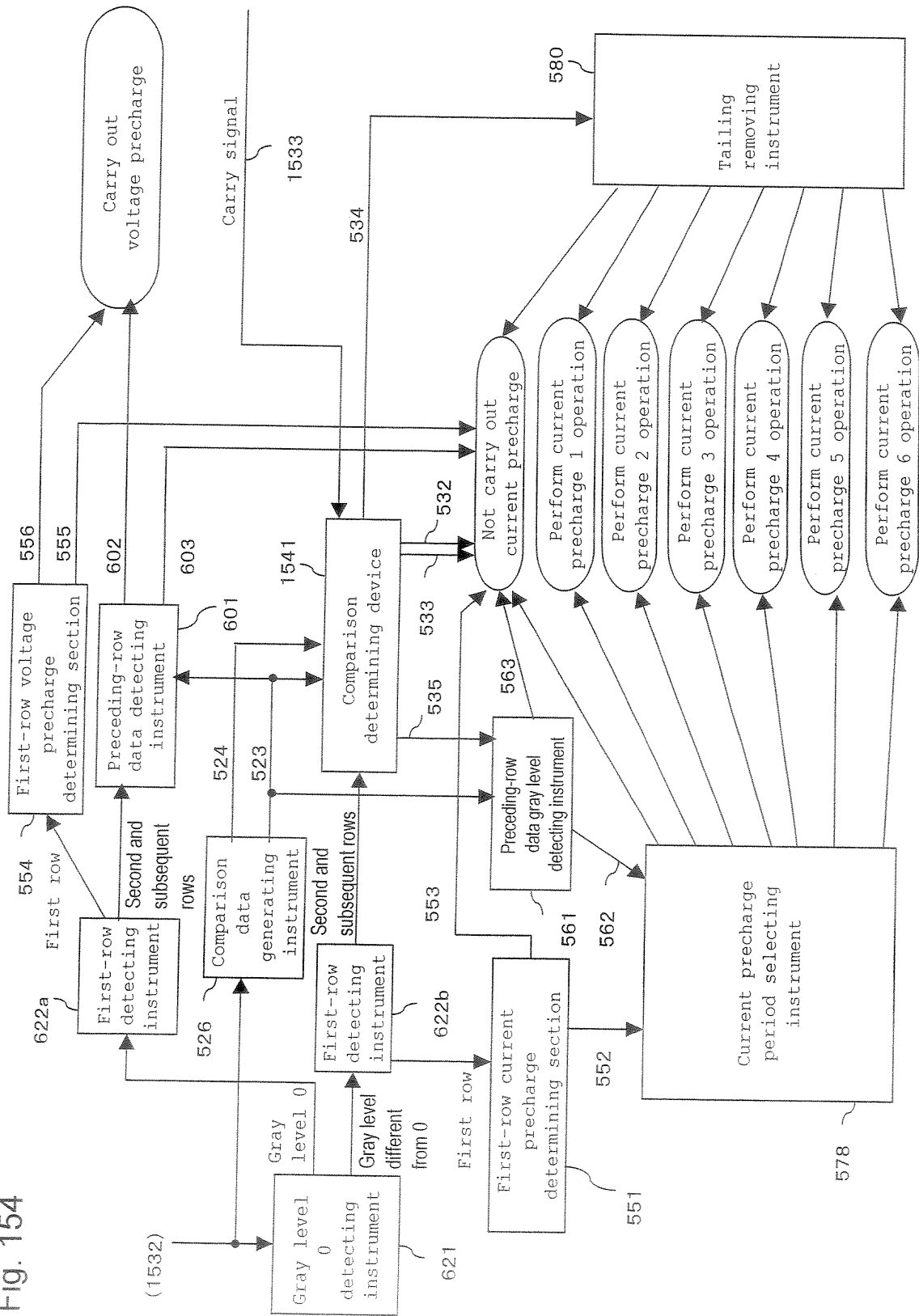


Fig. 155

1553						1555						1557						(1551a)					
1554						1556						1552h						(1551b)					
0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0
0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0

Fig. 156

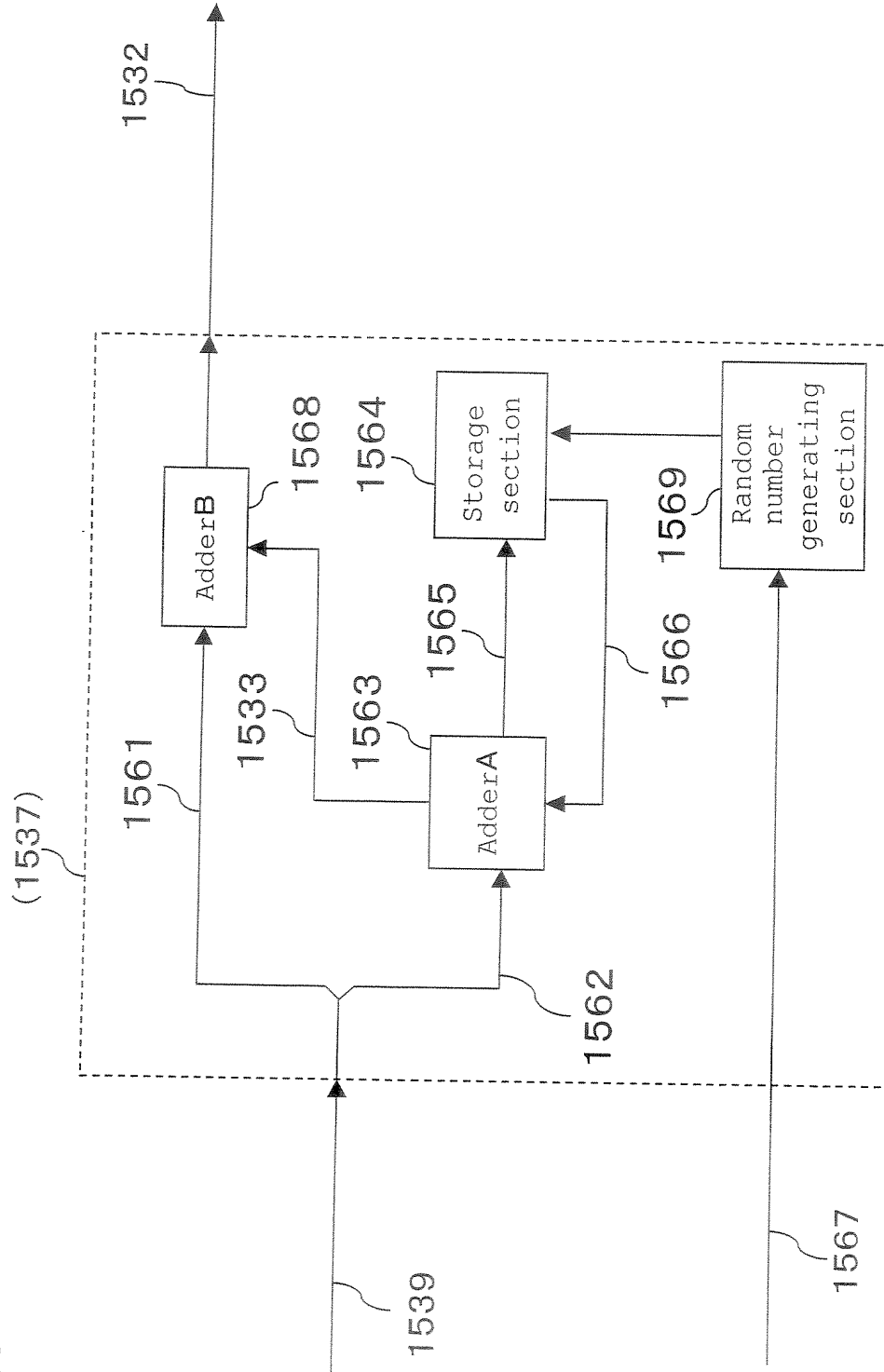


Fig. 157

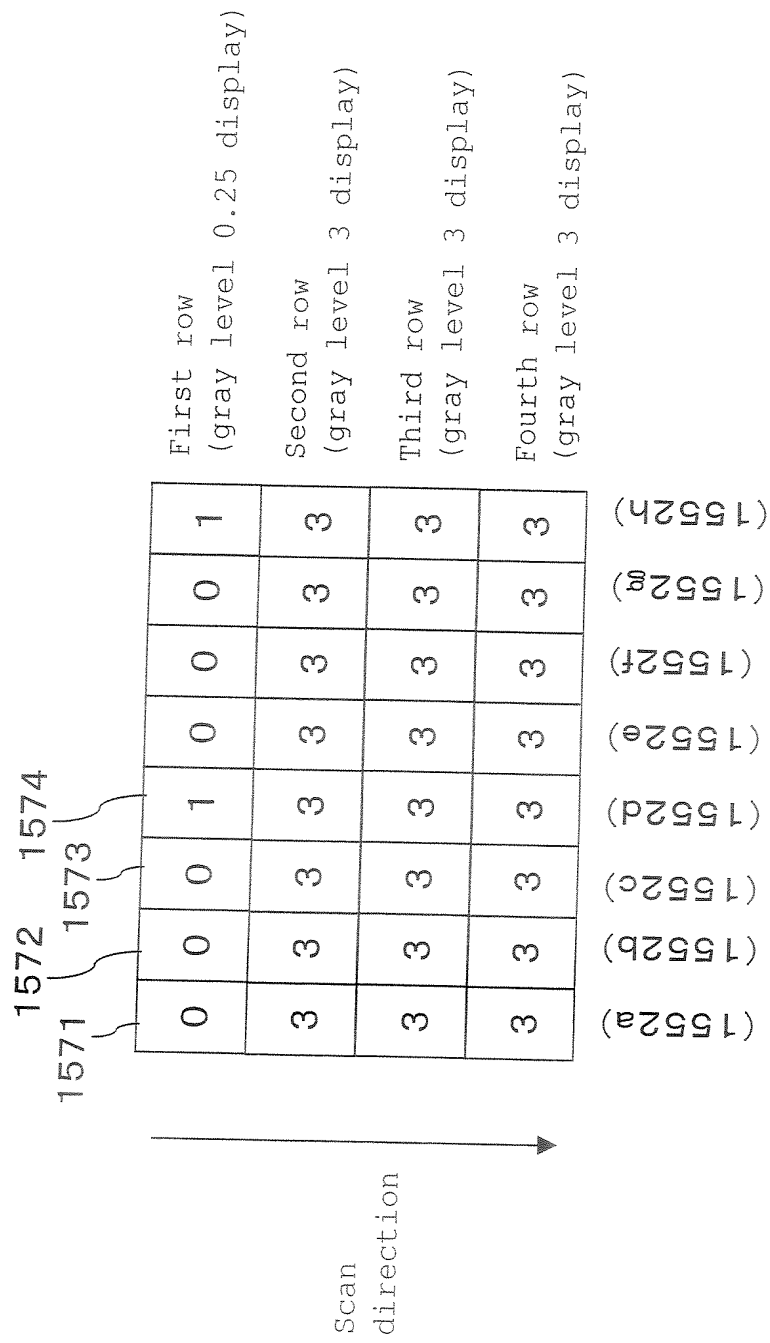


Fig. 158

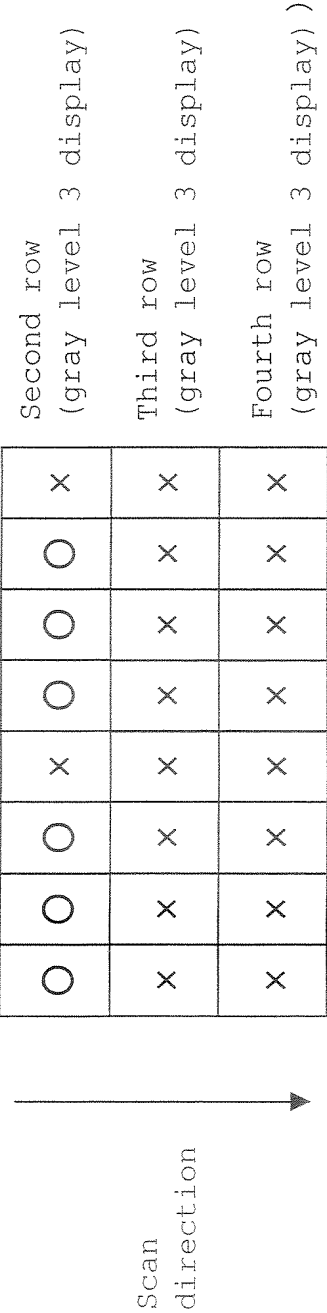


Fig. 159

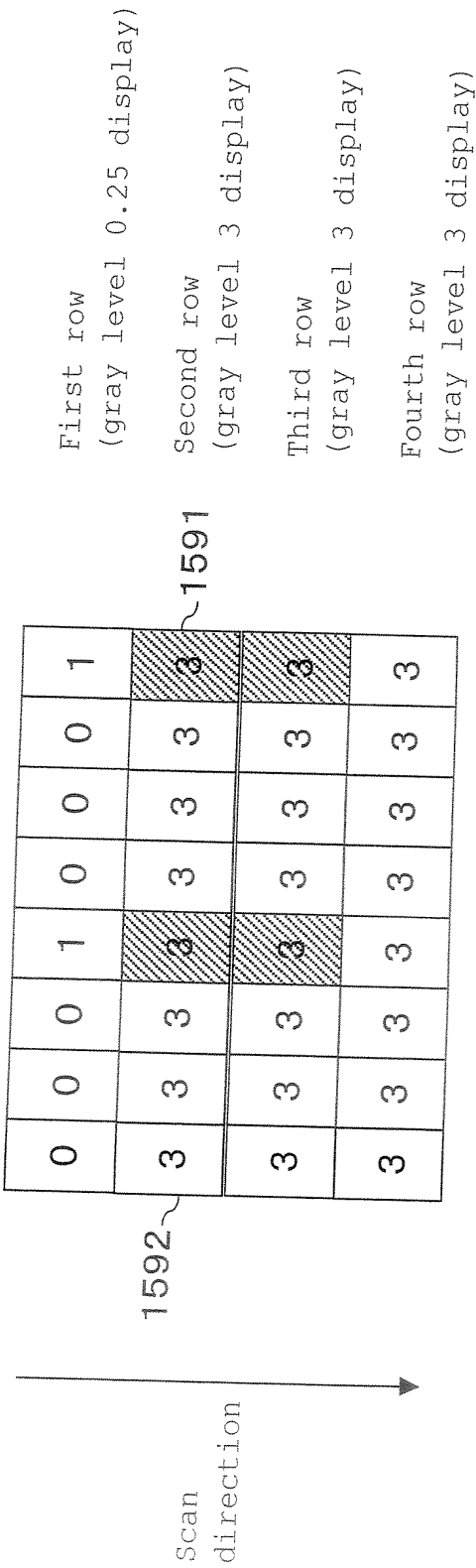


Fig. 160 (a)

Scan direction →

0 (0)	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)	1 (1)
3 (0)	3 (0)	3 (0)	3 (0)	3 (0)	3 (0)	3 (0)	3 (0)
3 (0)	3 (0)	3 (0)	3 (0)	3 (0)	3 (0)	3 (0)	3 (0)
3 (0)	3 (0)	3 (0)	3 (0)	3 (0)	3 (0)	3 (0)	3 (0)

First row
(gray level 0.25 display)

Second row
(gray level 3 display)

Third row
(gray level 3 display)

Fourth row
(gray level 3 display)

Fig. 160 (b)

○	○	○	○	○	○	○	○
×	×	×	×	×	×	×	×
×	×	×	×	×	×	×	×

Fig. 161

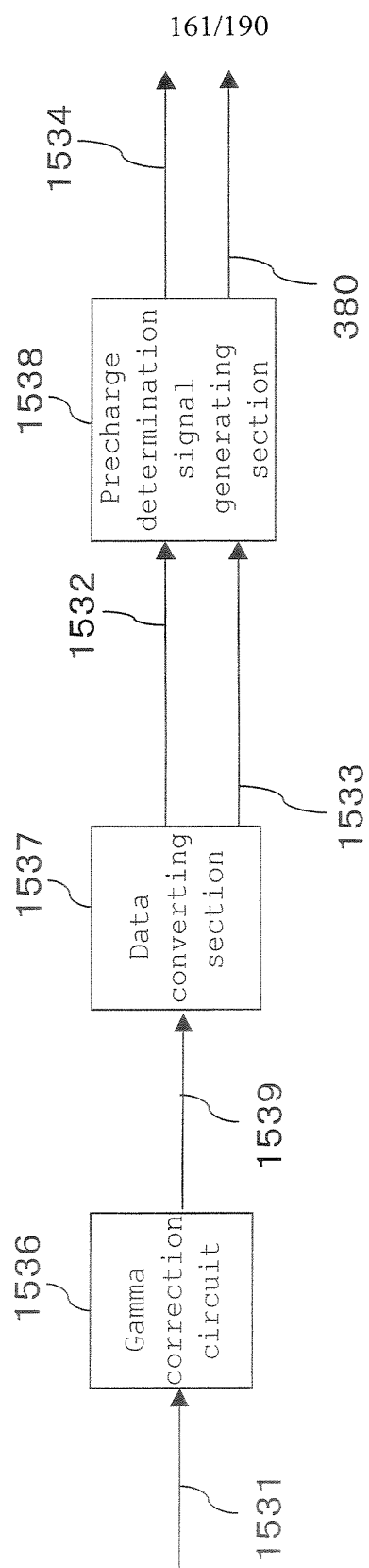


Fig. 162

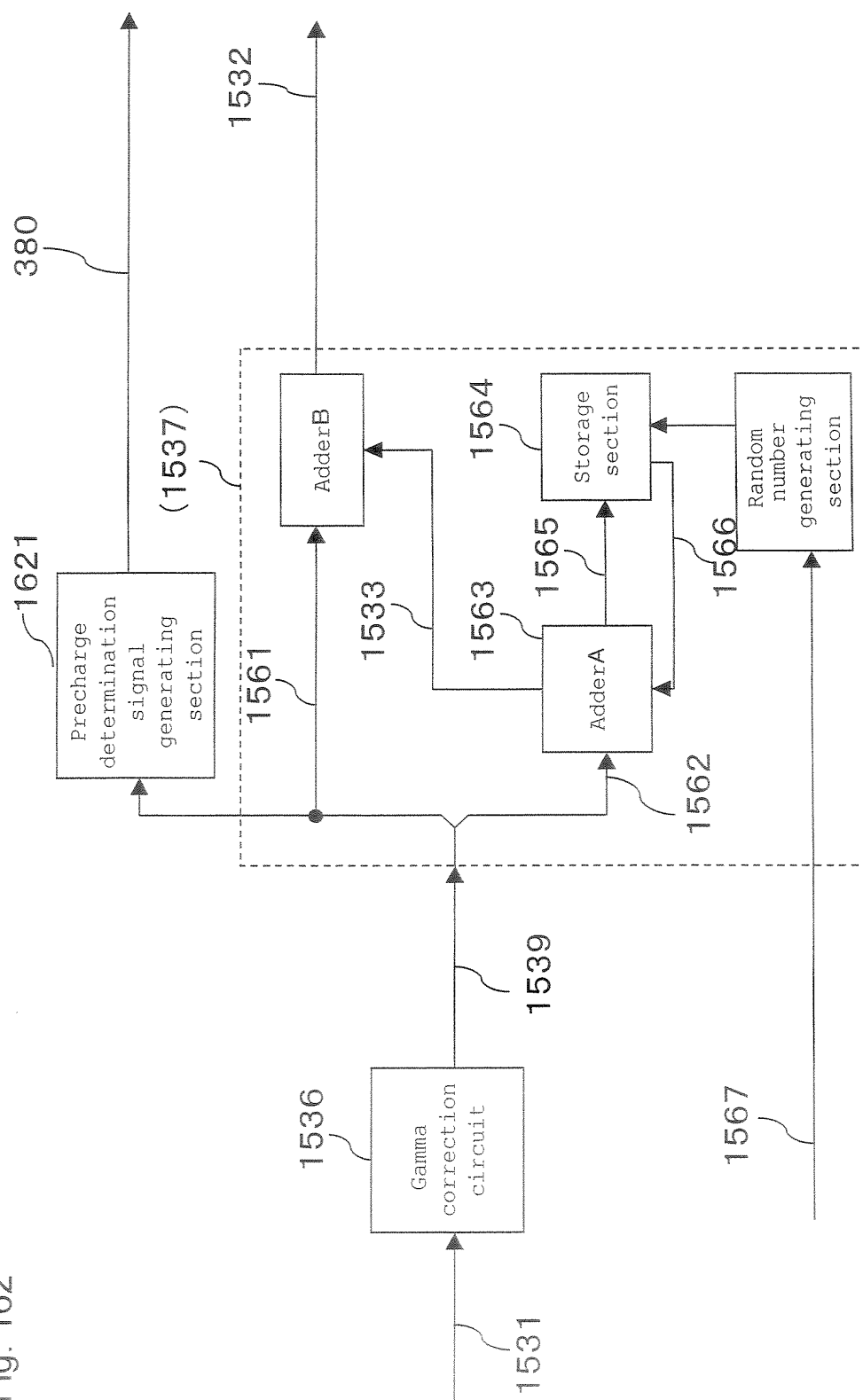


Fig. 163

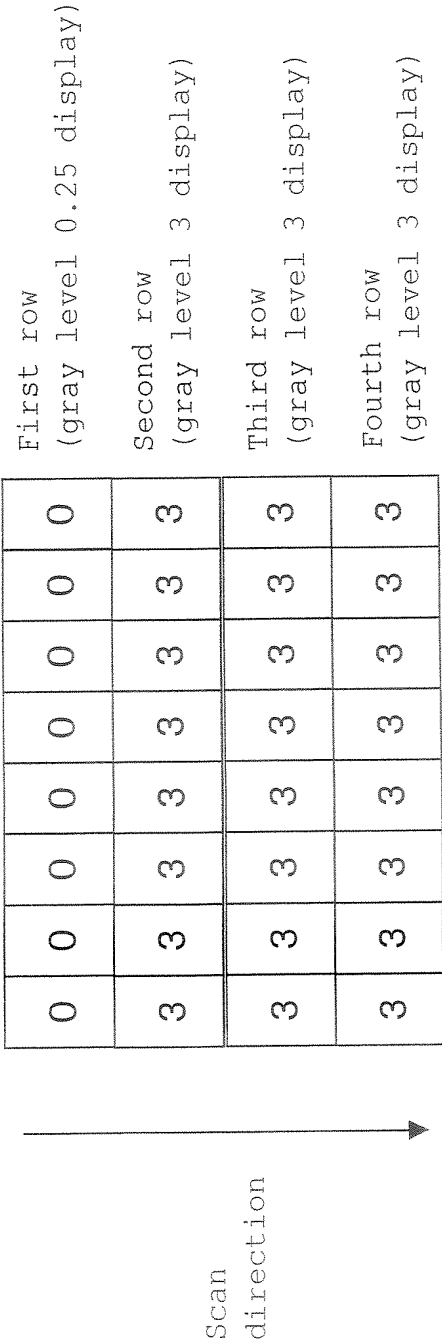


Fig. 164

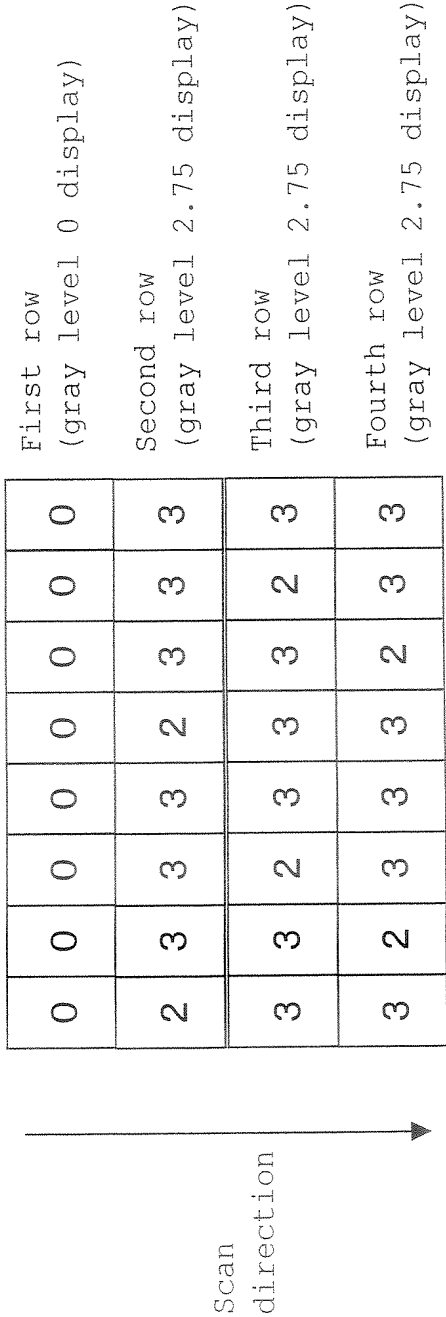


Fig. 165

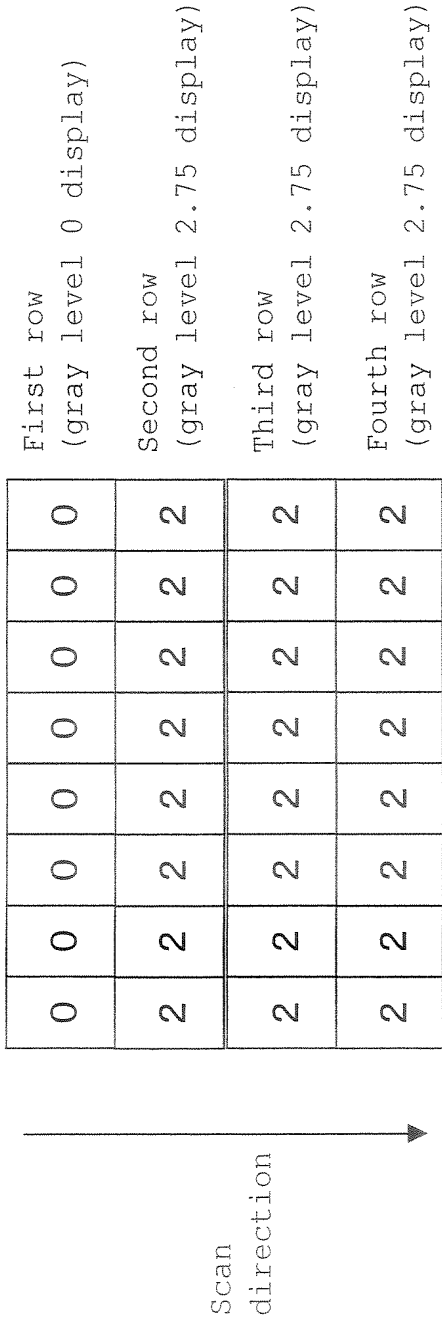


Fig. 166

Carry signal for preceding row (1533)	Current carry signal(1533)	Determination
0	0	Not carry out precharge
0	1	Not carry out precharge
1	0	Carry out precharge
1	1	Not carry out precharge

Fig. 167

Carry signal for preceding row (1533)	Current carry signal (1533)	Determination
0	0	Carry out precharge
0	1	Not carry out precharge
1	0	Carry out precharge
1	1	Carry out precharge

Fig. 168

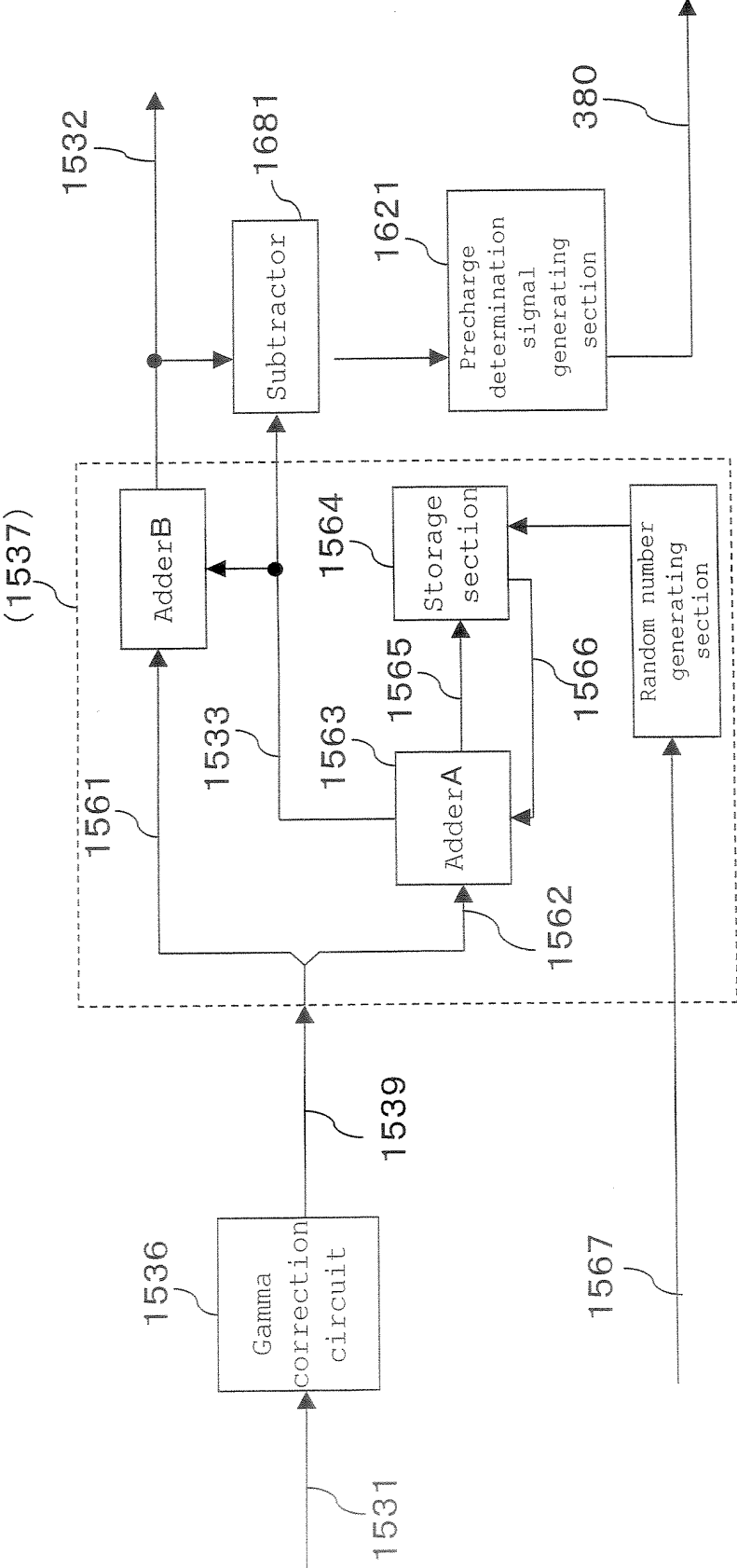
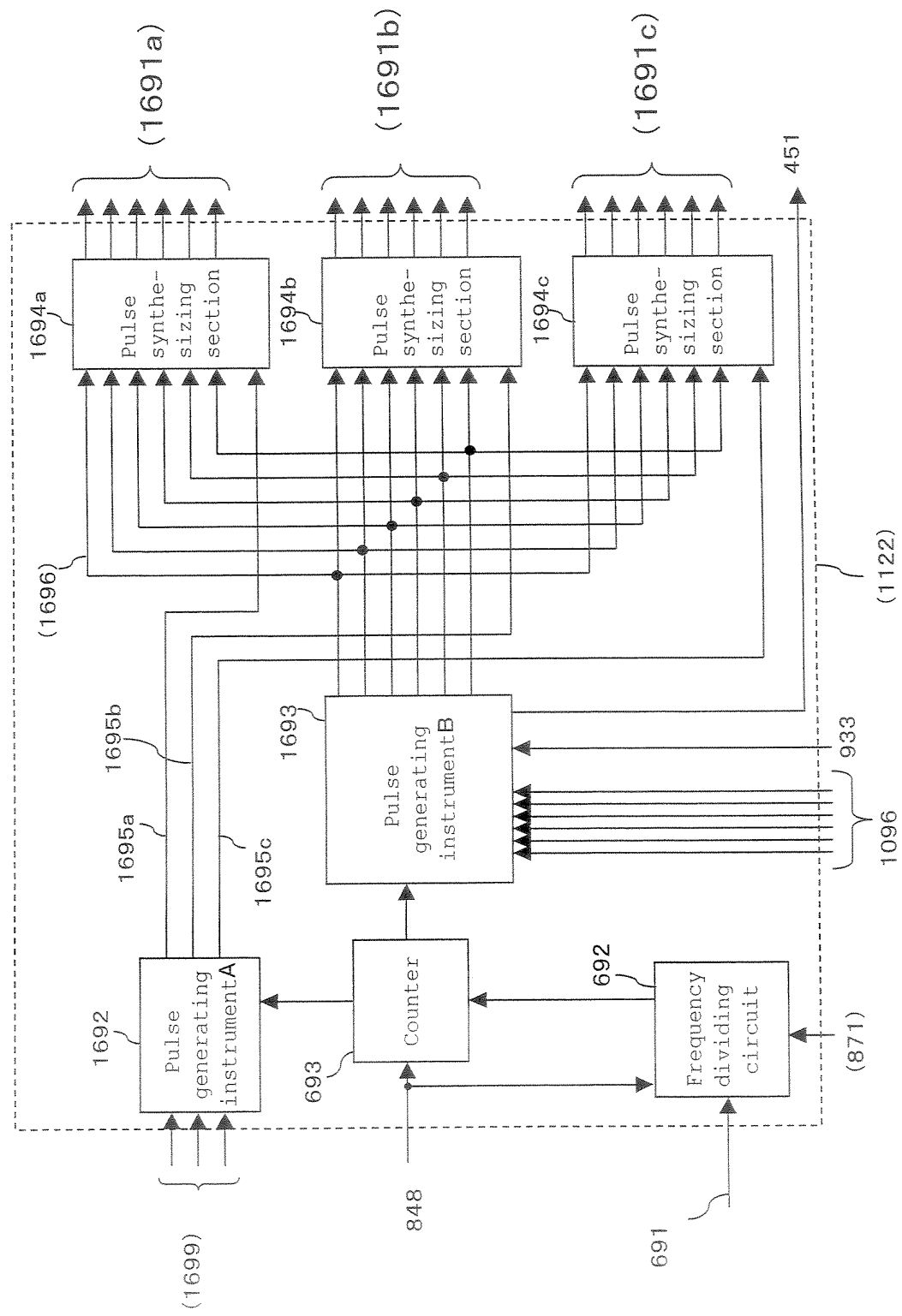


Fig. 169



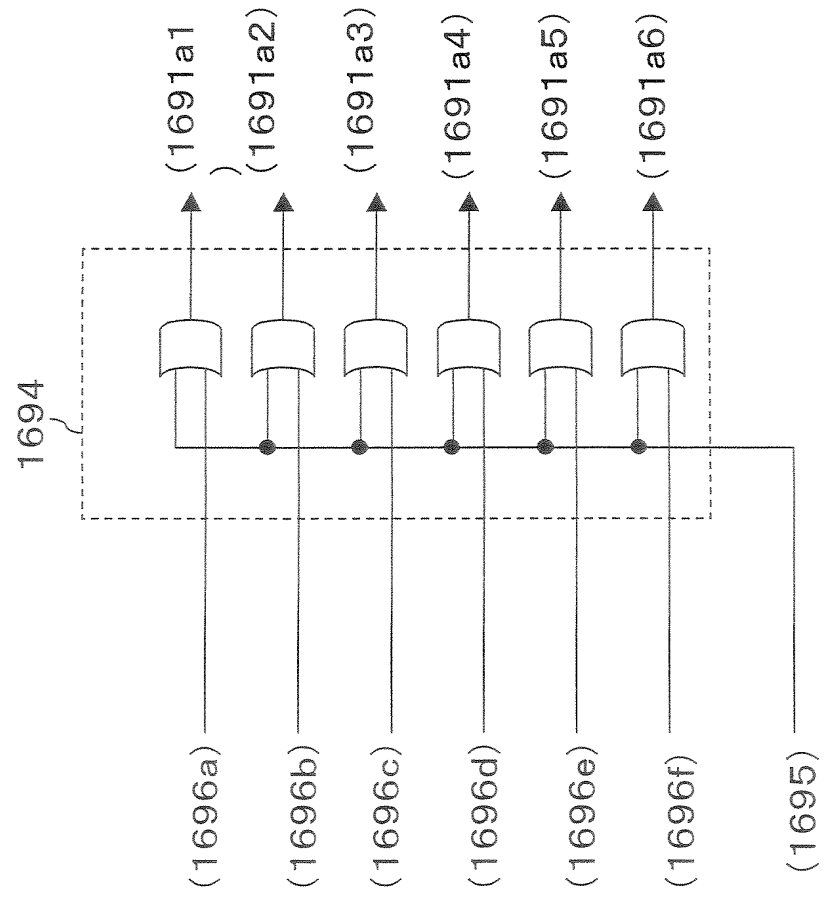


Fig. 170

Fig. 171

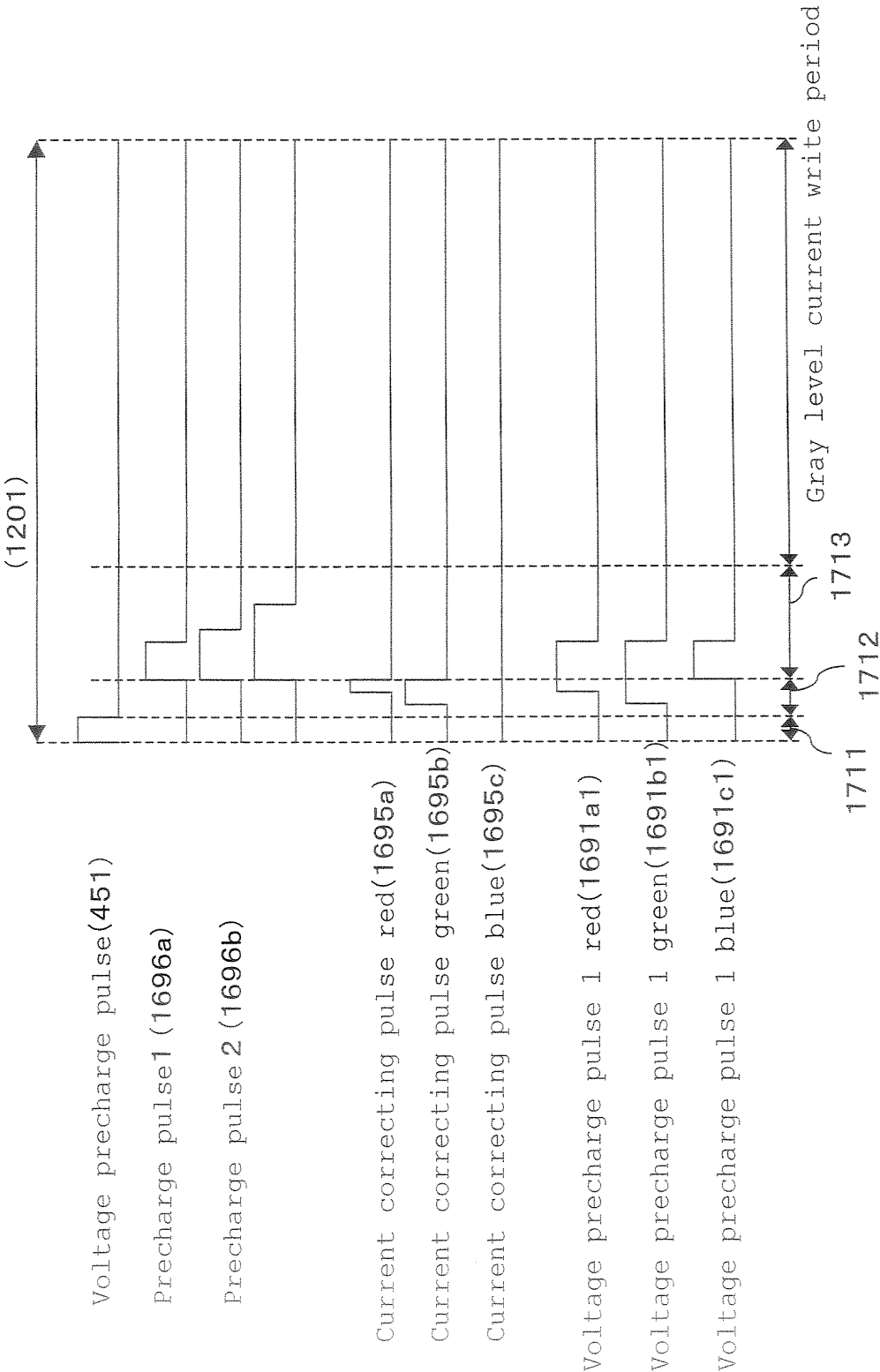


Fig. 172

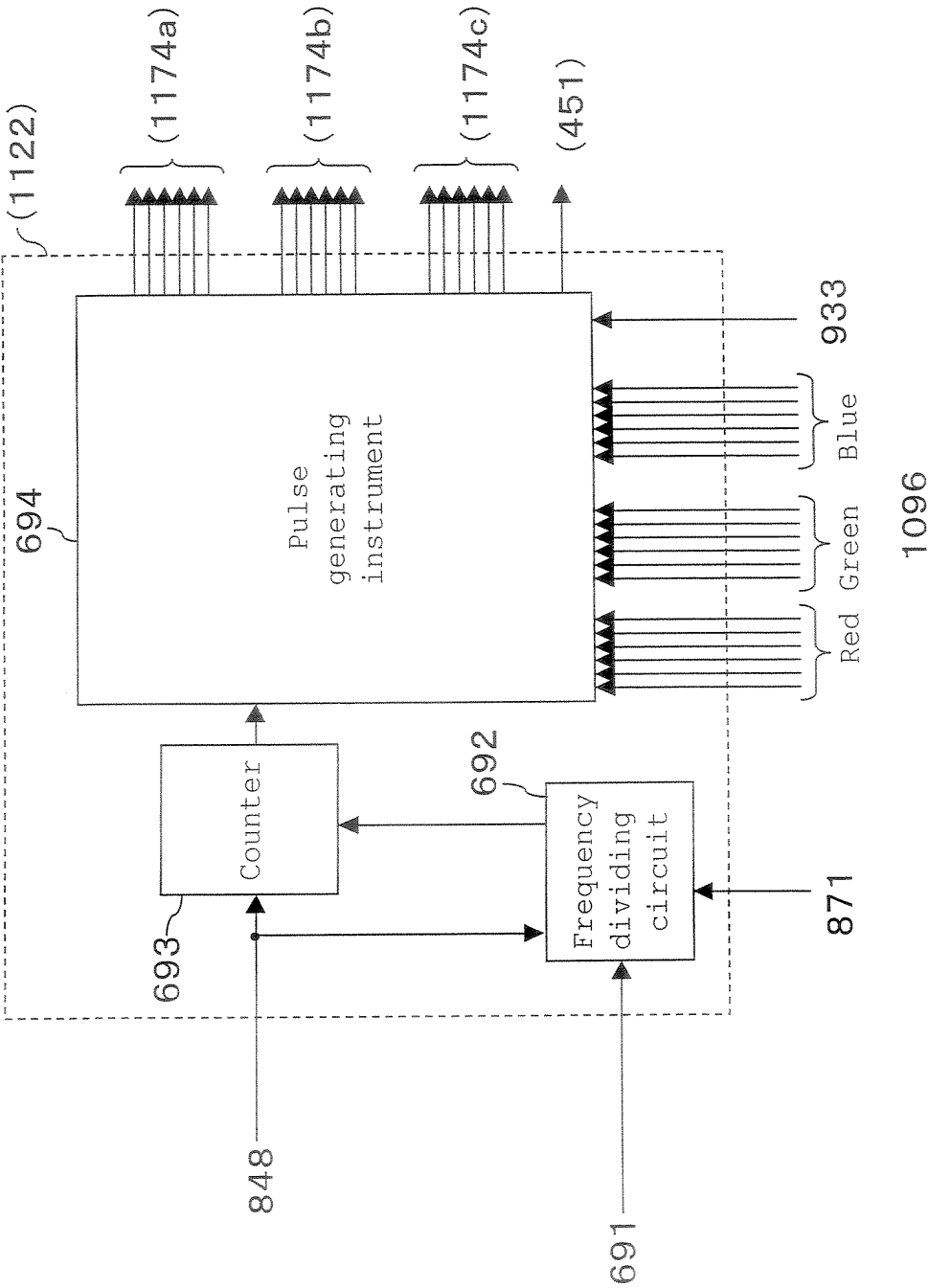


Fig. 173

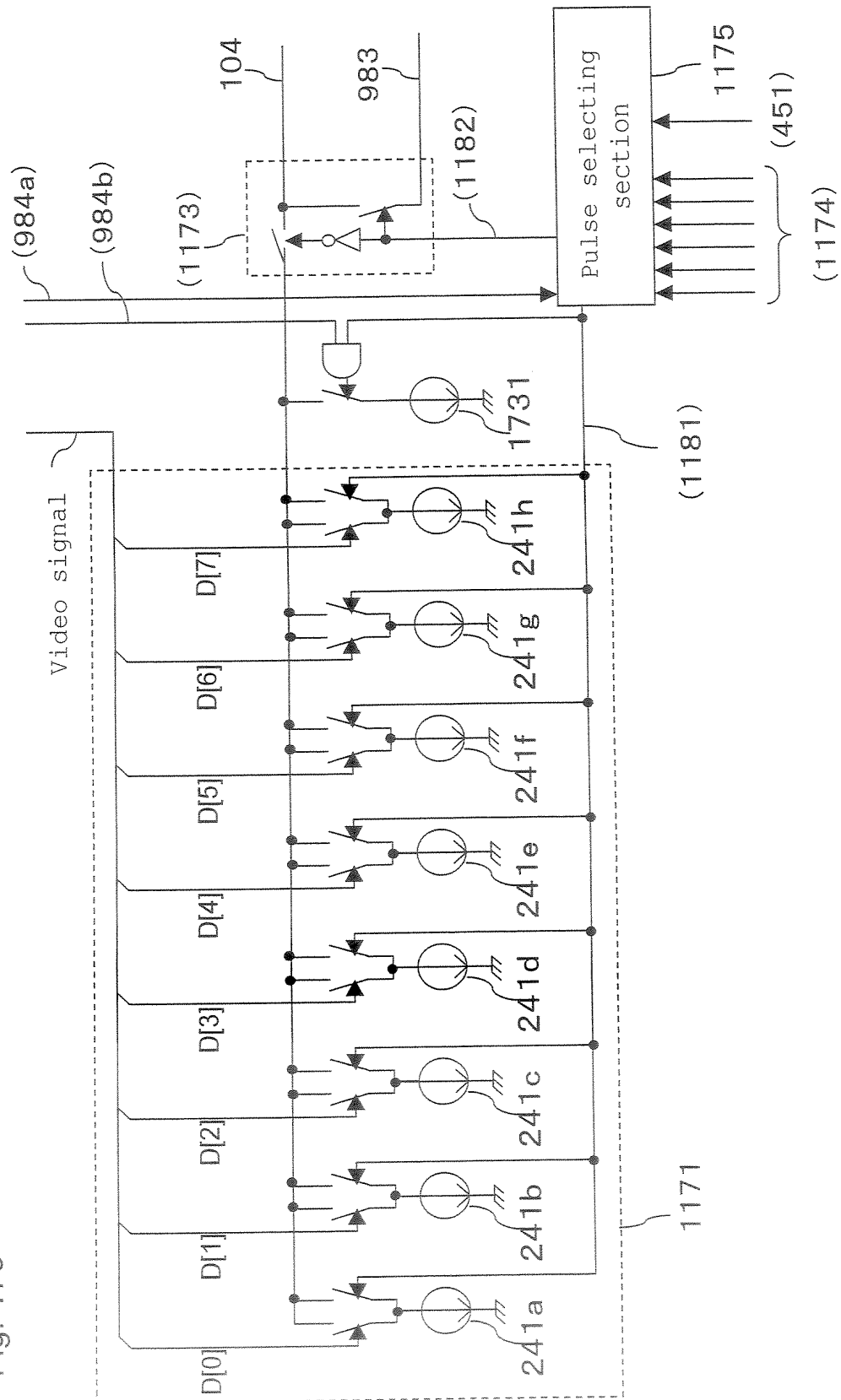


Fig. 174

Precharge determination line			Operation	
984b	984a		Voltage precharge	Current precharge (current value, period)
X	0	0	Not carry out	Not carry out
0	0	0	carry out	Current sources 241a to 241h used to carry out precharge during input of pulse 1174a
1			carry out	Current sources 241a to 241h and 1731 used to carry out precharge during input of pulse 1174a
0	0	1	carry out	Current sources 241a to 241h used to carry out precharge during input of pulse 1174b
1			carry out	Current sources 241a to 241h and 1731 used to carry out precharge during input of pulse 1174b
0	0	1	carry out	Current sources 241a to 241h used to carry out precharge during input of pulse 1174c
1			carry out	Current sources 241a to 241h and 1731 used to carry out precharge during input of pulse 1174c
0	1	0	carry out	Current sources 241a to 241h used to carry out precharge during input of pulse 1174d
1			carry out	Current sources 241a to 241h and 1731 used to carry out precharge during input of pulse 1174d
0	1	0	carry out	Current sources 241a to 241h used to carry out precharge during input of pulse 1174e
1			carry out	Current sources 241a to 241h and 1731 used to carry out precharge during input of pulse 1174e
0	1	1	carry out	Current sources 241a to 241h used to carry out precharge during input of pulse 1174f
1			carry out	Current sources 241a to 241h and 1731 used to carry out precharge during input of pulse 1174f
X	1	1	carry out	Not carry out

Fig. 175 (a)

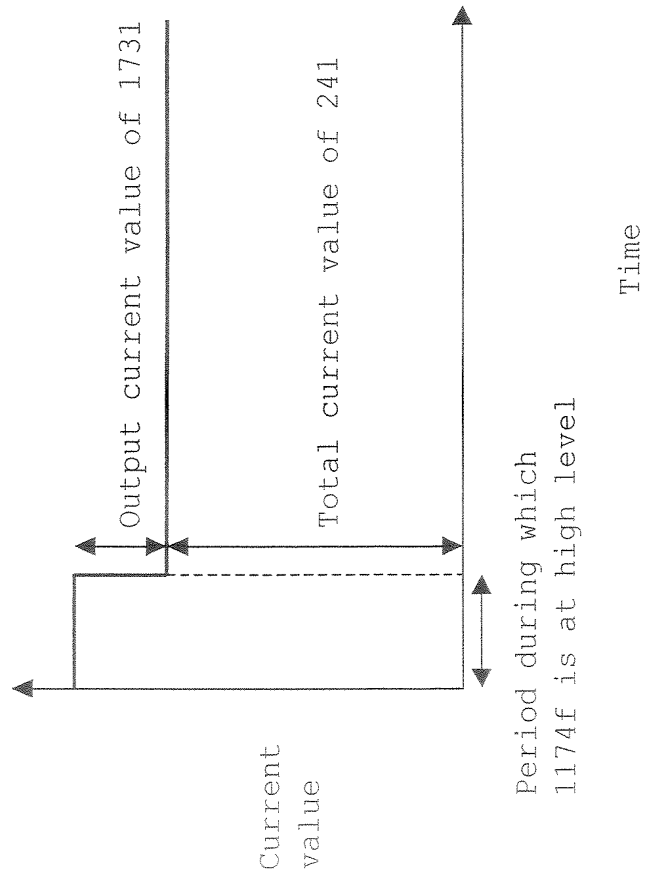


Fig. 175(b)

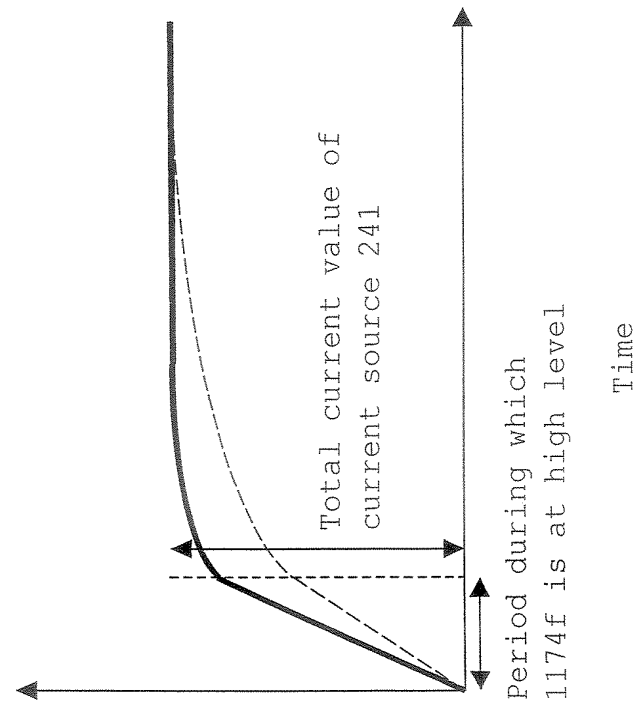


Fig. 176

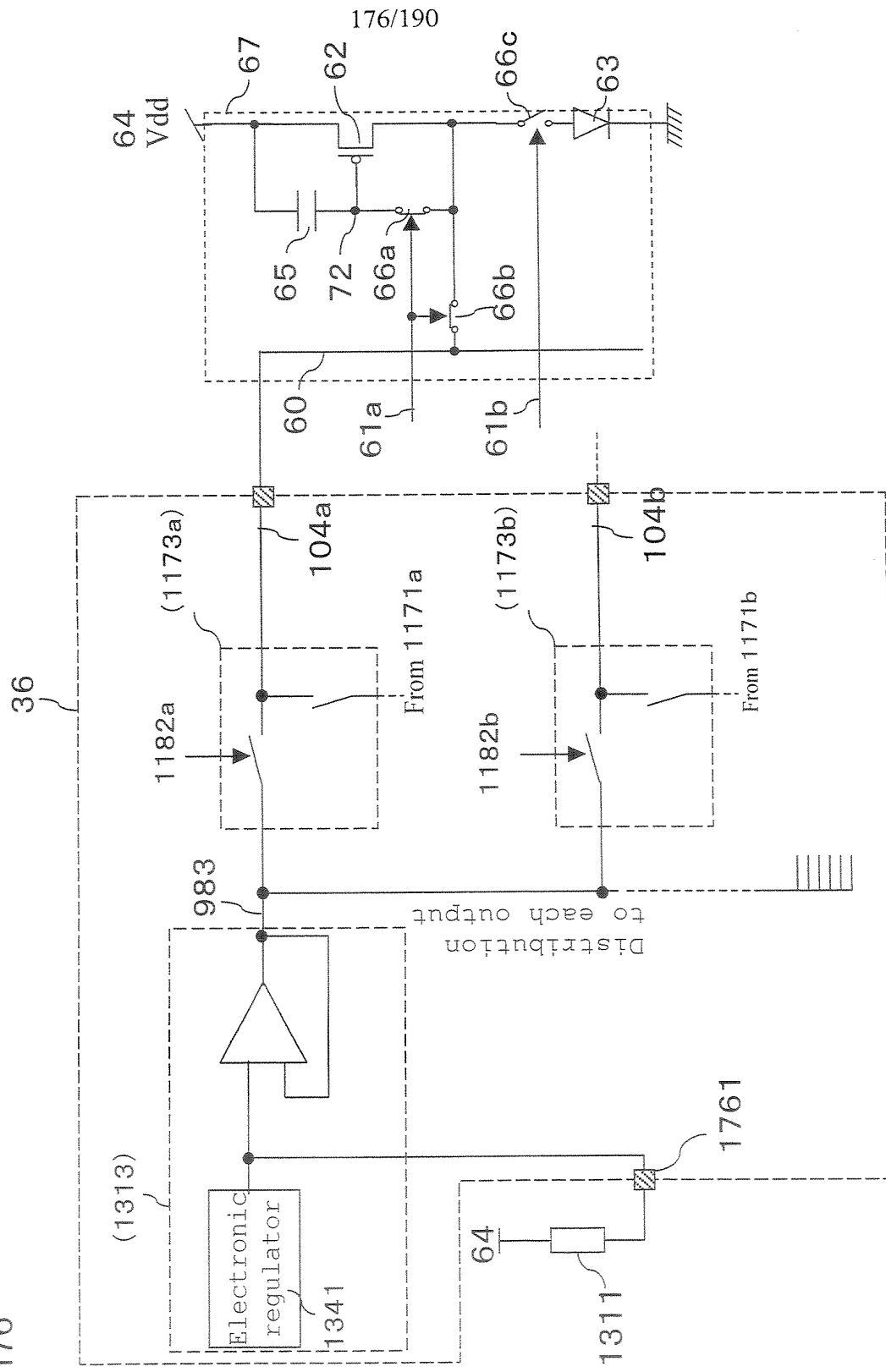


Fig. 177

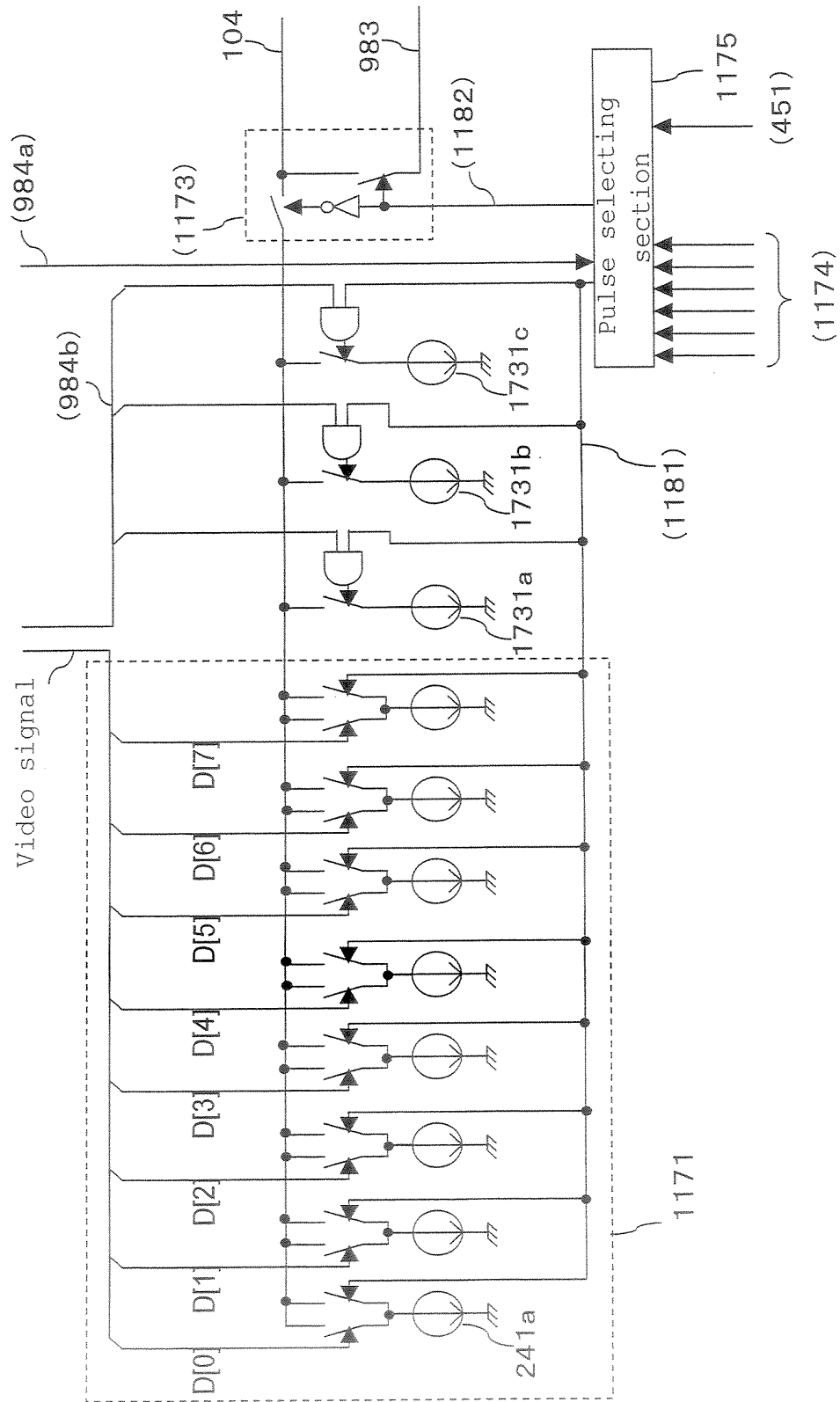


Fig. 178

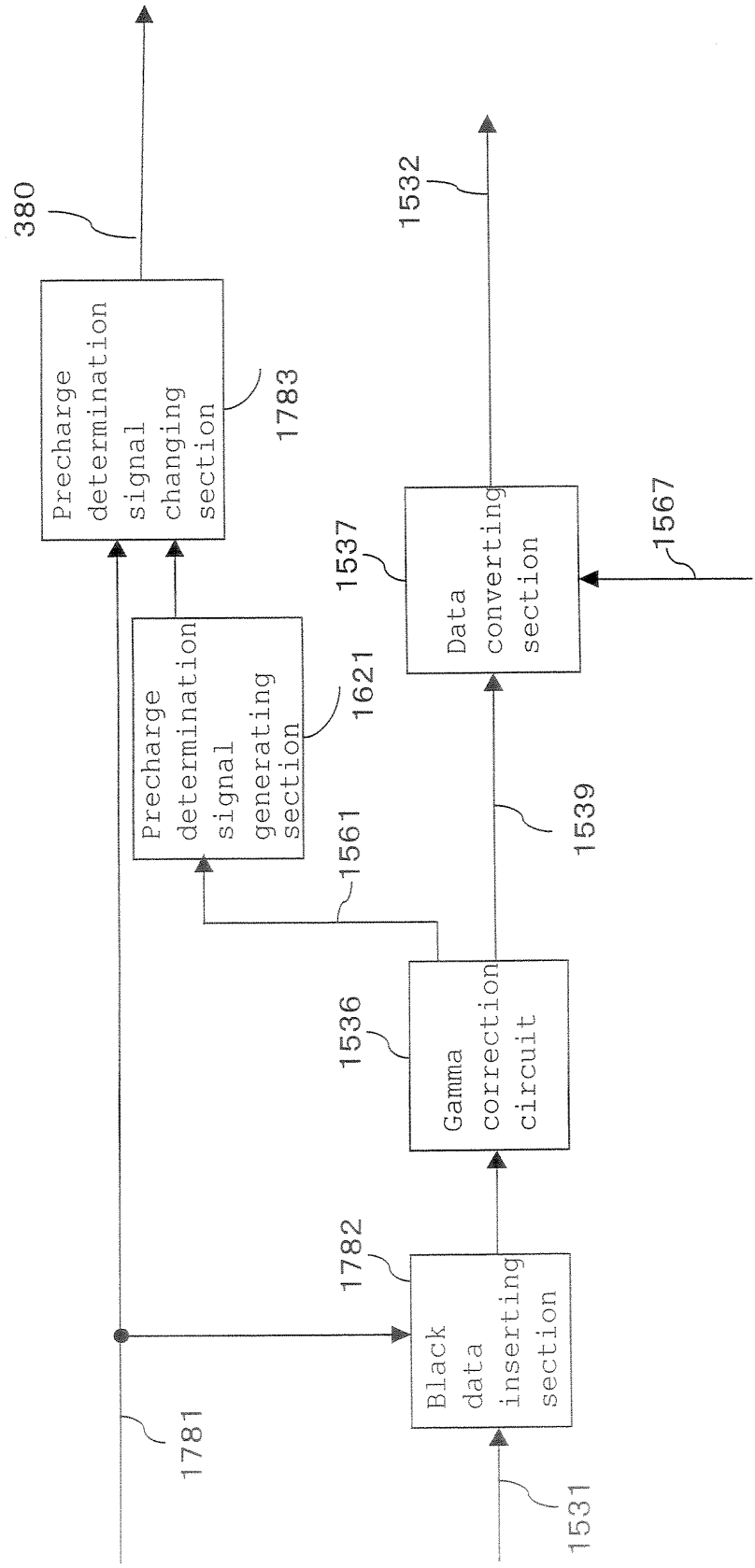


Fig. 179

State of data enable signal	Output from black data inserting section (1782)
Blanking period	Output gray level 0
Display data	Output same signal as input video signal

Fig. 180

State of data enable signal	Output from precharge determination signal changing section
Blanking period	Output "7" regardless of determination for input video signal (signal output required to carry out only voltage precharge)
Display data	Output determination for input video signal

Fig. 181 (a)

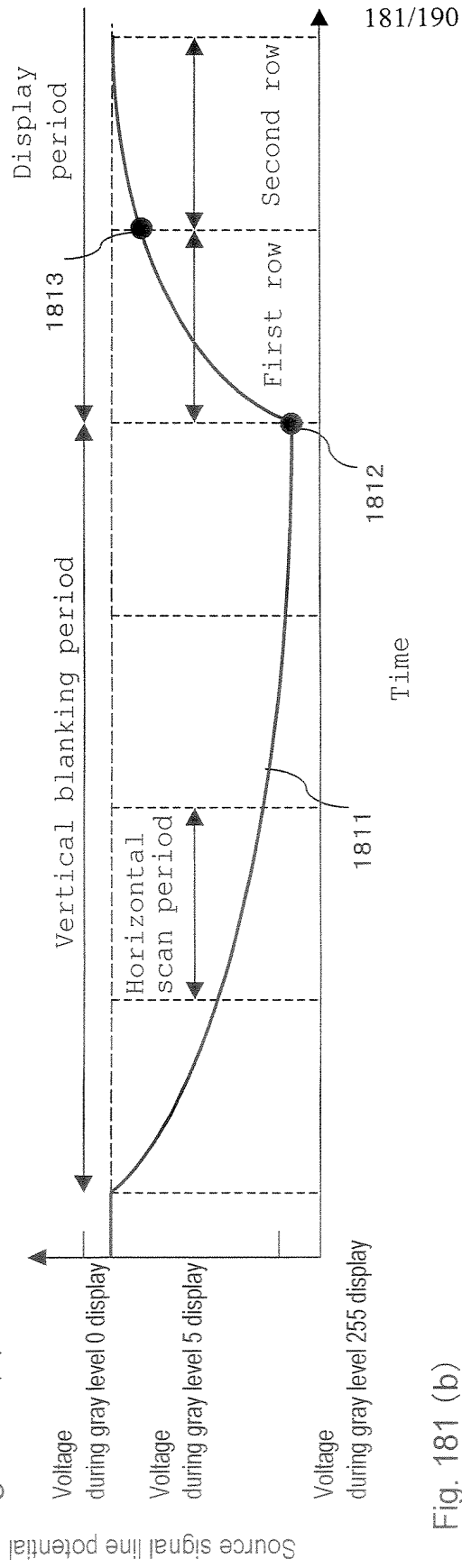


Fig. 181 (b)

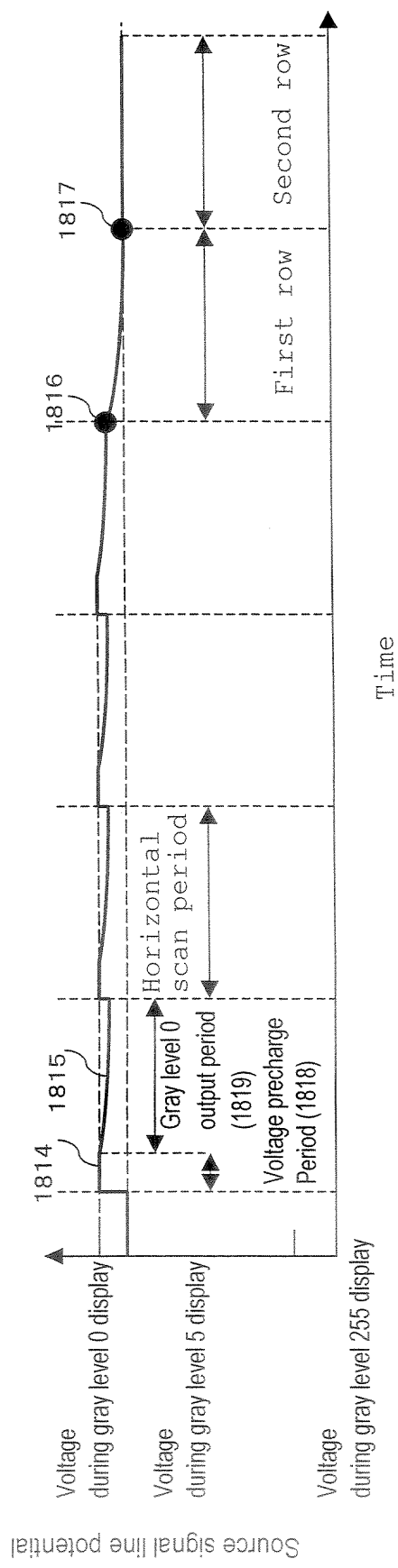


Fig. 182

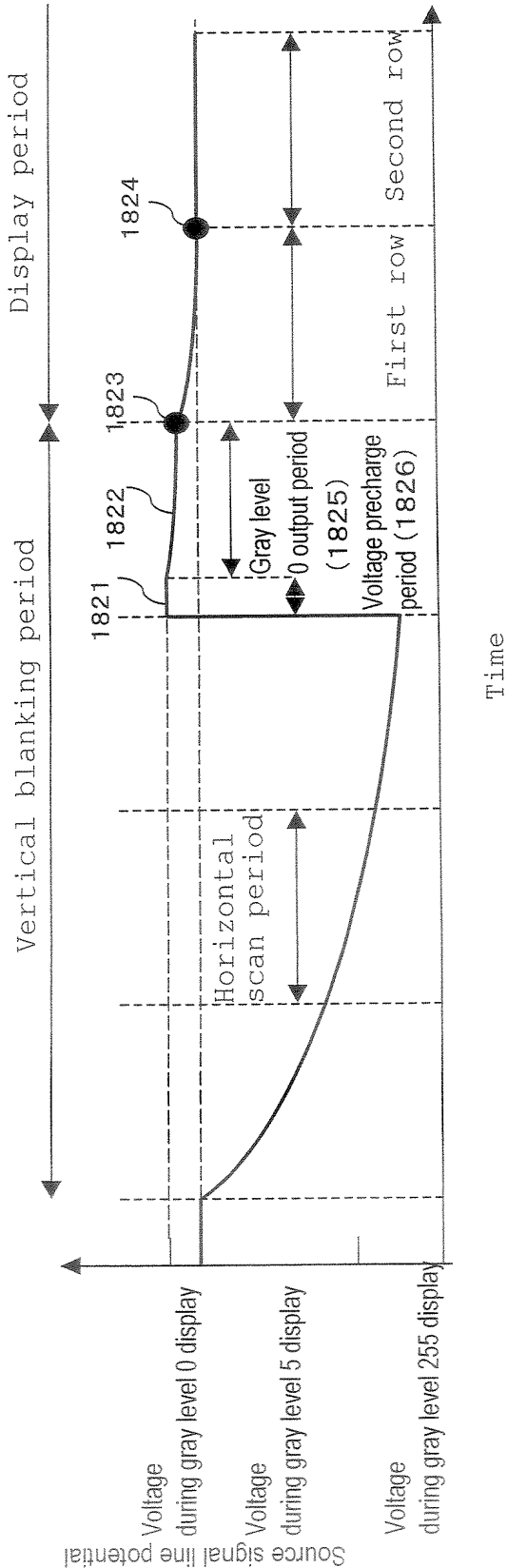


Fig. 183

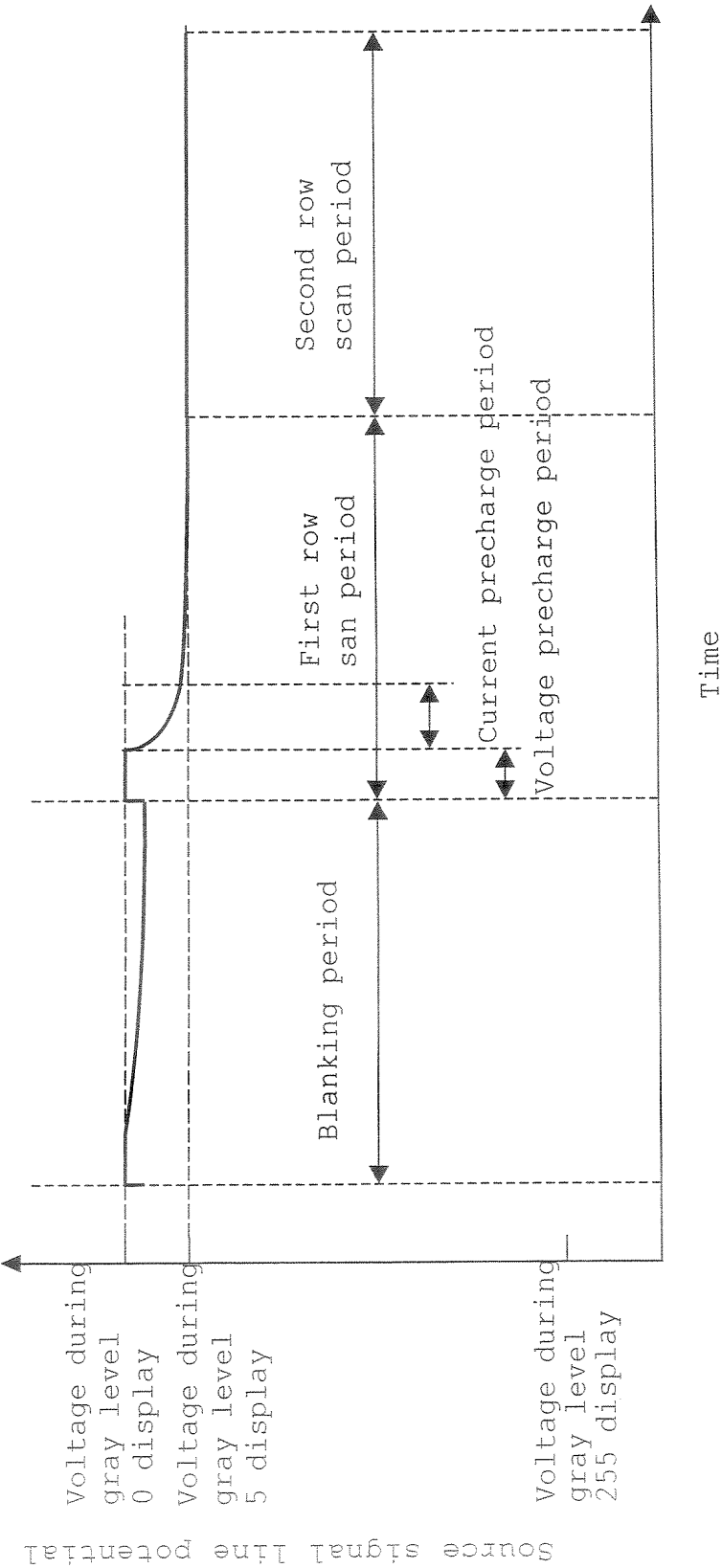


Fig. 184

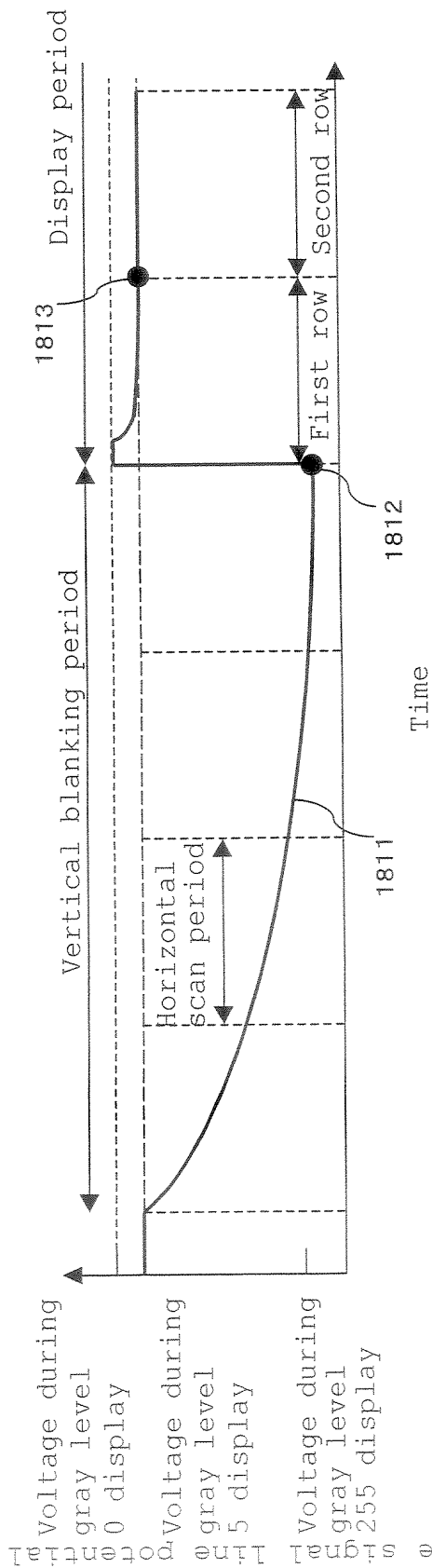
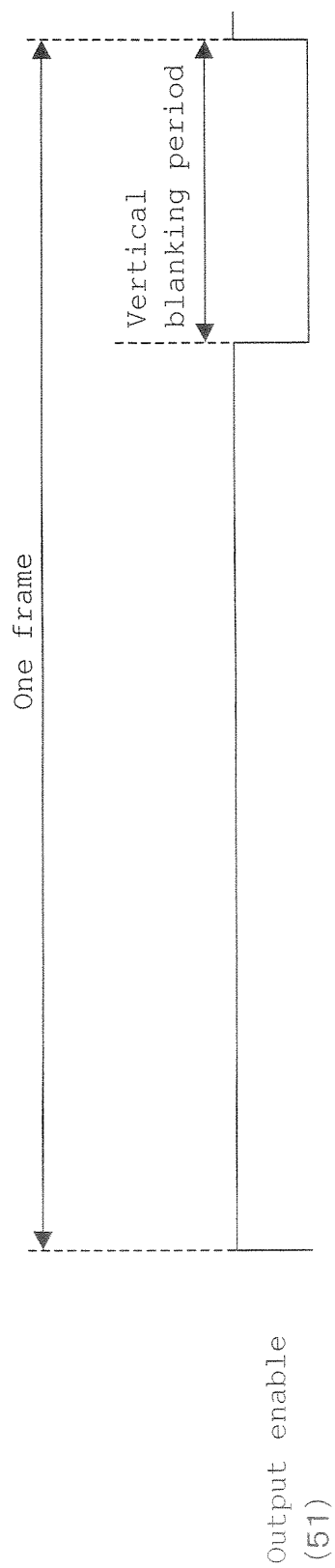


Fig. 185



Output enable
(51)

Fig. 186

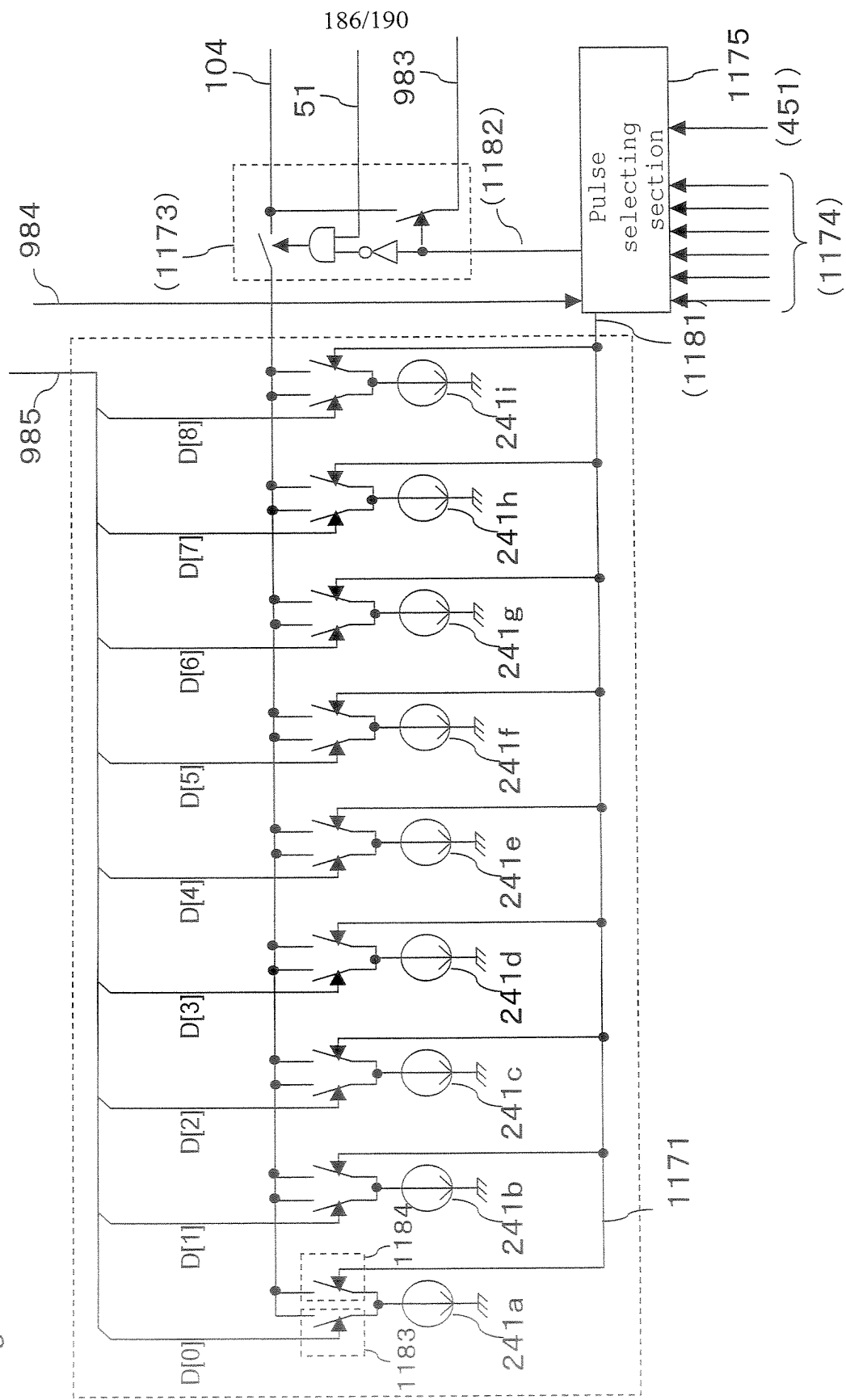


Fig. 187 (a)

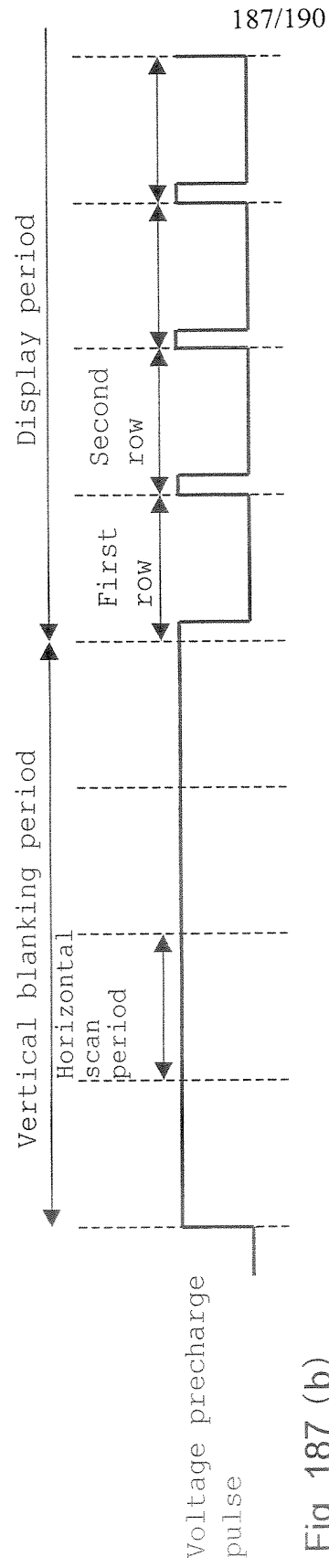


Fig. 187 (b)

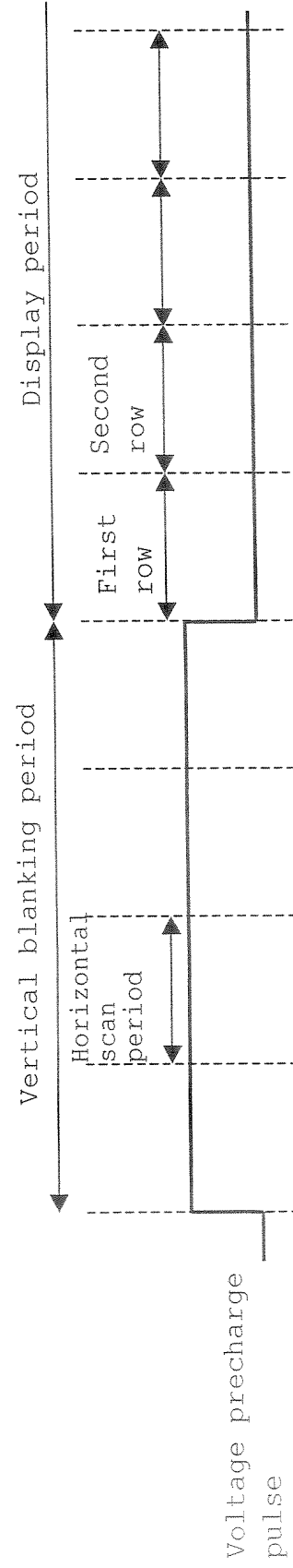


Fig. 188

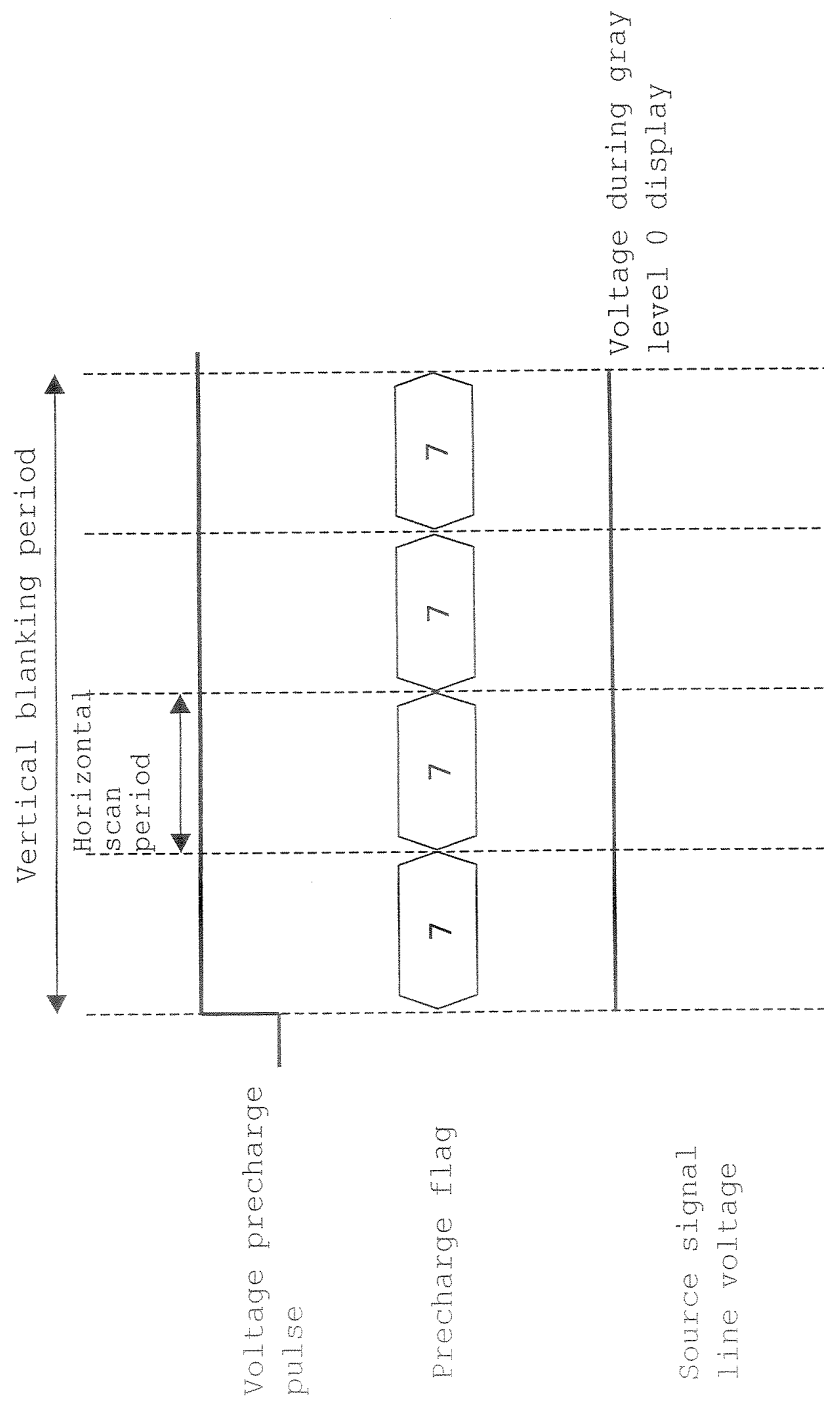


Fig. 189

